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The Mayo Clinic Guide to Pain Relief

Course Guidebook

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MAYO CLINIC

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Dr. Bruce was the clinical director of the Mayo Clinic Pain Rehabilitation Center in Rochester, Minnesota, from 1988 to 2014. She developed the

Mayo Clinic Pediatric Pain Rehabilitation Center there in 2008. Under her direction, both the adult and pediatric pain rehabilitation programs grew to become the largest programs of their kind, treating complex chronic pain patients with comorbid psychiatric and medical difficulties.

In Florida, Dr. Bruce developed Mayo Clinic's Fibromyalgia Treatment Program, which opened in 2014 and has treated more than 800 patients with fibromyalgia. She also developed Mayo Clinic's Chronic Abdominal Pain Program, also located on Mayo Clinic's Florida campus.

Dr. Bruce has numerous peer-reviewed journal articles, conference abstracts, and international and national presentations to her credit. She is also a medical editor of *Mayo Clinic Guide to Pain Relief: How to Manage, Reduce and Control Chronic Pain*.

Dr. Bruce has chaired numerous committees and has held a number of administrative positions within Mayo Clinic, including vice chair of the departmental Clinical Practice Committee, chair of the Division of Psychology, and chair of the Section of Behavioral Medicine. ■

ABOUT MAYO CLINIC

Mayo Clinic is a nonprofit organization committed to providing expert, whole-person care to everyone who needs healing. The Mayo Clinic mission is to inspire hope and contribute to health and well-being by providing the best care to every patient through integrated clinical practice, education, and research. For more information, visit www.mayoclinic.org/about-mayo-clinic or http://newsnetwork.mayoclinic.org/.

At the turn of the 20th century, Dr. Charlie and Dr. Will Mayo organized medical professionals in a new way to better care for patients. They created a system that allowed doctors to take the time to thoroughly investigate patient problems and to quickly and easily get help from other specialists.

The system was built on the idea that two heads are better than one. It also encouraged a continual search for better ways of diagnosis and treatment.

Through growth and change, Mayo Clinic remains committed to its heritage: thorough diagnosis, accurate answers, and effective treatment through the application of collective wisdom to the problems of each patient. ■

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THE MAYO CLINIC GUIDE TO PAIN RELIEF

Research indicates that nearly one in three people in the industrialized world is living with some type of chronic pain. While the science of medicine has become adept at handling acute (or short-term) pain, many of those who live with chronic pain—that is, pain that lingers for more than three months and often outlasts the injury or illness that caused it—sometimes find that there is no simple treatment for their condition.

Chronic pain is also frustrating because, more often than not, it is invisible to those around us. No matter what pain feels like—jolting, burning, dull or sharp, for example—it can be exhausting to deal with, and it stirs up feelings of anger, grief, and sadness. Understandably, people coping with chronic pain are often focused on what they are not able to do. They focus on what has been lost.

The practice of interdisciplinary pain management addresses chronic pain by flipping this perspective on its head. By focusing on what people *can* accomplish despite their pain, we can gradually, carefully, and moderately develop those abilities. In developing those strengths, people learn how their individual physiology responds to the experience of pain, how certain triggers worsen their pain, and how to change their behavior and their environment to reduce their pain—without the use of strong medicines.

Based on decades of research and clinical practice, this course will teach you how interdisciplinary pain management techniques can offer effective ways to manage chronic pain. Your instructor—drawing on decades of experience in developing and leading interdisciplinary pain management programs at Mayo Clinic—will take you through both the theory and practice of interdisciplinary pain management.



The course begins with a discussion of the medical and neurobiological basis of chronic pain: how it differs from acute pain both from a practitioner's standpoint and within the human body. You will learn what pain actually is, why some people experience pain differently than others do, and why pain sometimes becomes chronic. You will also learn about the most common causes of chronic pain, including the concept of central sensitization, which may underlie a variety of conditions once thought to be separate issues.

Next, you will consider the most common treatment for acute pain—medication—and why it may not be the best choice for chronic noncancer pain. From there, you will begin to look at different and effective alternatives. This is where the practice of interdisciplinary pain management takes center stage.

Your study of interdisciplinary pain management begins by discovering the importance of exercise and physical conditioning and how it goes beyond injury-specific physical therapy to treat the entire person. Next, you will examine the role that stress management plays in pain management and

how stress-reduction techniques (including integrative therapies) can help reduce your experience of pain.

You will then consider the role that social support plays in pain management—from maintaining healthy personal relationships to making the most of support groups. Next, you will encounter sleep, one of the most underappreciated aspects of overall well-being and a key player in the experience of pain. Finally, you will discover the tangled skein of pain and mood and how addressing the sadness, grief, anger, and other emotions that may come with the experience of chronic pain is vital to the pain management process.

As you learn about interdisciplinary pain management techniques, you will be putting what you learn into practice by developing goals along the way. These goals will enable you to set appropriate targets for your particular situation and measure your progress.

In the final section of the course, you will learn how to use these goals—in cooperation with guidance from your health-care team—to develop your own personalized interdisciplinary pain management program. You will learn how to track, analyze, and adjust your goals; how to deal with setbacks; and how to set new goals as your pain improves.

Finally, the last lecture of the course includes several active sessions: guided exercises for stress reduction, flexibility, strength, and cardiovascular fitness. After consulting with your health-care team, you can use these active sessions to get started on your own pain management journey.

This course is designed to put your pain management back in your hands—to empower you to cope effectively with and reduce your pain, rather than let your pain control your life. This course offers you the tools that, with patience, care, and persistence, will put you back in charge of your life. ■

LECTURE **1**

WHY PAIN MATTERS

With nearly one in three adults coping with some sort of chronic pain, you might think that you'd see evidence of pain more often—that you'd be able to tell whether or not a person is in pain. But that's not always the case. More often than not, pain is invisible, but it's every bit as real as something you can see, such as a broken bone. Although there's not always a cure for pain, there are ways you can manage chronic pain effectively and live an enjoyable and fulfilling life. Throughout this course, you'll learn about the many ways that you can learn to manage pain.

WHAT IS CHRONIC PAIN?

- Chronic pain is different from acute pain. We all experience acute pain from time to time. It's the kind of pain that happens when you break a bone, cut yourself on a knife, have a stomachache, or even undergo open-heart surgery.

- Acute pain is self-protective—it's a warning that something is wrong with our bodies and we need to do something about it. Acute pain may be minor, or it may be very severe. But as you heal, it goes away.

- Alternatively, chronic pain is a pain that doesn't go away as you heal, or that returns again and again, or that seems to come out of nowhere.

- Back, neck, and other joint issues can cause chronic pain. Osteoarthritis and rheumatoid arthritis can cause chronic pain. Conditions such as fibromyalgia and irritable bowel syndrome are characterized by very real long-term pain.

- A third type of pain involves serious—and sometimes terminal—disease. This includes cancer and noncancer pain, and in some cases, it overlaps with chronic pain.



- Noncancer pain is pain connected to a life-threatening illness other than cancer. Cancer pain, on the other hand, may be caused by the disease itself, or it might be caused by cancer treatments, diagnostic tests, or a combination of other factors.

- Palliative care is the practice of addressing these types of pain, whether it's end-of-life care or simply care for serious illness. You don't have to be facing the end of life to receive palliative care. It's different from hospice care, which is available only at the end of life.

- This course will focus on chronic noncancer pain.

- You have probably experienced some form of acute pain and know how to treat it. For example, if you have a headache, you take an over-the-counter analgesic or anti-inflammatory. If you have a more serious surgery, you might be on opioid medication for a few days to a few weeks. You might even need physical therapy to rehabilitate.

- But in the end, hopefully you go back to living your life the way you did before—with no medication or doctors' or therapists' appointments and maybe a new daily strengthening or stretching routine and a few new scars, but you are essentially pain-free.

- Those who live with chronic noncancer pain aren't so lucky. Whether due to chronic illness or to changes in neurophysiology that we are just beginning to understand, some people feel pain for months, years, or even decades after their original illness or injury.

- Chronic pain can have major consequences, including being unable to work. For many people, the inability to work would be financially problematic and emotionally stressful.

- Chronic pain can also mean losing your quality of life. Maybe you're no longer active enough to travel as you once did.

DRUG THERAPY

- Many people who cope with chronic pain visit multiple doctors, looking for the cause of their pain. They go through many tests, drugs, and therapies with no real change in their pain level. This process can be time-consuming, expensive, and anxiety-provoking.

- Part of the reason for this process is that the difference between patient expectations and medical realities often leads to disappointment for the patient. Many people expect chronic pain to respond to the same kinds of treatment as acute pain, but they don't.

- The drugs used to treat acute pain are mainly opioids, also known as painkillers or narcotics. Opioid drugs are prescribed under many trade names, but they have generic names that you are probably familiar with, such as hydrocodone and oxycodone.

- They are called opioids because they are synthetic cousins of opium and the drugs derived from it, such as heroin and morphine. Although these drugs were deliberately created to be just like morphine, for many decades, doctors and patients alike believed that synthetic opioids had little or no potential to be addictive.

- But this isn't true. You've probably heard many frightening statistics about what's commonly called the opioid crisis. You've likely heard that even patients who take their opioid prescriptions perfectly as prescribed can end up with abuse problems, including turning to heroin when their medications are withdrawn.

- Chronic pain and opioids are a bad match. Opioids, just like real opium, mimic the natural pain-relieving chemicals produced by our brains—the endorphins. These drugs bind to the endorphin receptors in the brain and reduce the activity of nerve cells throughout the body.

- In other words, opioids “turn down the volume” not only on your pain, but on all the nerve signals your body. That includes autonomic processes such as breathing and heart rate.

- Research shows that over time, your body adapts to these medications, and they bring less and less relief. This phenomenon, known as tolerance, means that you need more and more of the same medication just to achieve the same level of relief.

- Furthermore, the suppression of autonomic processes can lead to a phenomenon called respiratory depression, where you simply stop breathing.

- Perhaps less frightening but nonetheless unpleasant, these drugs have common side effects, such as constipation, nausea, and muscle rigidity. They can make you dizzy and sedated, which will keep you from carrying on everyday activities. They can compromise your immune system or cause hormonal dysfunction, which can add new diseases to your roster of medical problems.

- But most importantly, opioids are extraordinarily addictive. According to the Substance Abuse and Mental Health Services Administration, part of the U.S. Department of Health and Human Services, prescription drugs are misused and abused more often than any other drug except for marijuana and alcohol.

- And the problem is increasing. Research at the Centers for Disease Control and Prevention has shown that there were four times as many deaths from prescription opioid abuse in 2013 as in 1999.

- Opioids have long been prescribed to manage chronic pain. But researchers have realized that we’ve never established the safety of these drugs for use longer than three or four months. And we now know that the longer the use, the higher the risk of addiction and overdose seem to become.

- Because a person with chronic pain needs a long-term solution for long-term symptoms, opioids are a bad fit. Best practices for prescribing these drugs are now changing, and these medications will no longer be readily available for the management of chronic pain.

- This leads to an important question: What will you do to manage your chronic pain if your mainstay is opioids? What if your opioids aren't helping you live a better quality of life?

- There are plenty of alternatives, but they're not quite as simple as taking a pill. For example, a growing body of evidence points to interdisciplinary pain rehabilitation programs or pain management programs as the best solution for chronic pain.

- Each program is a little different, but they all have a similar idea at their core: identifying and changing the factors in each person's life that contribute to that person's pain. Those factors go far beyond whatever injury or illness originally triggered the pain.

- Although there are many pain management programs throughout the United States and throughout the world, not everyone has easy access to them—for reasons of geography, time, finances, or other confounding factors.

- This is the reason for this course, the goal of which is to help you, with the assistance of your primary care provider, design a pain management program for yourself or for a loved one who is experiencing chronic pain.

- Even more critical than the physical changes patients undergo are the changes that these programs make in their attitude and self-confidence. When you believe that you can "turn down the volume" on your pain, this enables you to actually do it.

- Pain management isn't about taking a single step or making a single change; it's about a system of changes that complement each other. Some of them are aimed directly at reducing pain,

some are aimed at regaining lost functioning, and some are aimed at learning how to work with your body rather than against it.

- There is a role for pharmacotherapy—drug therapy—in treating pain, but the goal of pain management therapy is to help minimize or eliminate medication use whenever possible.

PAIN MANAGEMENT

- Effective pain management is often a multifactorial process; there's no single treatment or therapy that acts as a magic bullet. For many people, chronic pain is a vicious cycle: You hurt, so you do less, so you fall behind on your work and cut back on your social life, so you become isolated, so you get stressed out, so you feel worse, so you do less, and so on.

- We sometimes discount the importance of social relationships in a well-balanced life, but social support has many health benefits. It keeps us mentally and physically active. It keeps us from ruminating on the problems in our lives. It gives us something to look forward to. You may need to find different ways to relate to your friends while managing your pain, but that doesn't have to be a bad thing.

- Not every pain management patient will be able to recover without any further medical intervention. No single course of treatment is right for everyone, and not everyone can expect to live 100 percent pain-free.

- But some improvement is possible for just about everyone through some combination of medical therapies, physical therapies, psychological support, social support, and lifestyle interventions. That's the reason that pain management programs can be so effective: They aren't one-size-fits-all prescriptions but, instead, are unique and flexible systems that address an individual's needs.

- No matter what sort of pain you're experiencing, good diagnostics are key. Seek out the cause of your pain. If your pain is new, or if



it's getting worse, visit your primary care provider to discuss your condition. A primary care doctor will be able to tell you what tests could be helpful and when to consult a specialist.

- Your primary care provider is also valuable in chronic pain management because that person knows you. Your primary care provider knows where you started and where you are now and is most likely to know and understand the changes you've gone through.

- Ultimately, no matter what specialists get involved in your diagnosis, your primary care provider will be at the center of your care.

- Doctors' visits are only one part of a comprehensive pain management program. In addition to taking this course, to start managing your pain, reach out to others. Isolation is a significant problem for people who have chronic pain.

- One of the most insidious aspects of chronic pain is that, even on their best days, people who suffer from chronic pain feel cut off from

the rest of the world. They hesitate to make plans they're not sure they can keep. They wonder if overdoing it on a good day will make things worse on a bad day. Sometimes, they feel like a burden.

- But cutting yourself off from the world is a mistake. Human beings are social creatures. People who deal with chronic pain need strong social networks for two reasons:

 1. It's important to have a part of your life that is not centered on your pain. Social activities will help you live a richer, more balanced life. Think about a social activity you enjoyed before your pain took over. Has it fallen out of your life? Is it possible to take it up again? If not, could you take up a similar but easier activity?

 2. Think about the close relationships you already have in your life and how those relationships are doing. Pain not only puts a burden on the sufferer, but it also puts a strain on those who care about him or her. Some handle it well, while others don't handle it as well. Make sure that your relationships are about more than just your pain while still ensuring that your medical needs are met.

SUGGESTED READING

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American Physical Therapy Association, "NIH Says Current Treatment of Chronic Pain Has Created 'Silent Epidemic.'"

Harris, "Chronic Pain, Social Withdrawal, and Depression."

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LECTURE **2**

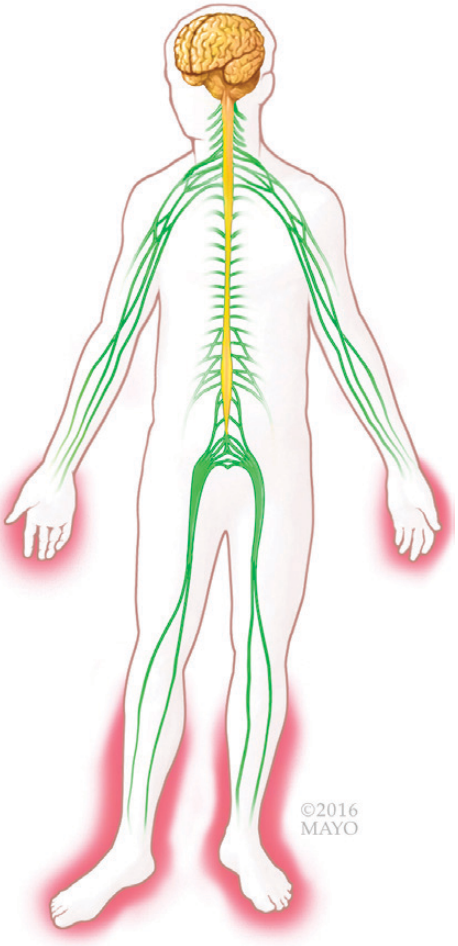
WHAT IS PAIN?

What exactly is pain? We all experience pain, but what's going on in our bodies when pain happens? What are the mechanisms that allow us to experience pain? What purpose does pain serve? Perhaps most importantly, how can we make it stop? Pain is defined as a localized sensation of discomfort or distress resulting from the stimulation of specialized nerve endings. In other words, we define pain as a neurological issue. But it's a bit more complex than that.

THE NEUROLOGY OF PAIN

- Any sensation of pain begins with the activation of specialized neurons at the site of the injury. Neurons, or nerve cells, can be divided into three broad types: autonomic neurons, which take care of the automatic processes of our bodies, such as breathing, digestion, and heart rate; motor neurons, which control movement; and sensory neurons, which transmit information from our senses.

- Pain is a sensory process, and is transmitted by sensory neurons. More specifically, pain is transmitted by a subtype of sensory neurons called nociceptors, which can be further divided into



several different types, each of which responds to a different type of pain—pressure, heat, cuts, inflammation, and even chemical changes.

- There are also fast and slow types of nociceptors. Fast nociceptors respond to severe pain. Slow nociceptors transmit information

about dull or aching pain. In other words, the more urgent the information, the faster it travels.

- Nociceptors can be found anywhere in the body that may be affected by something harmful or by internal injury, including the skin, muscles, bones, joints, and internal organs. Most nociceptors send information that's interpreted as pain within higher centers of the nervous system. Their job is to detect stimuli that are likely to signal possible—or actual—damage to your body.

- In simpler terms, nociceptors are a defense mechanism. Their basic job is to send a message about an event that's harming your body. That message travels through the body all the way to the brain by the descending pain modulatory system (DPMS).

- The nociceptive nerve endings and the nerves that carry the pain signals are part of the peripheral nervous system, which refers to all of the 100 billion neurons found outside the brain and spinal cord.

- These neurons align into long, branching networks of nerve fibers. Groups of interwoven nerve fibers are called plexuses. Plexuses eventually lead to the spine, which leads to the brain stem and the other major structures of the brain.

- When nociceptors detect damage, they send electrical impulses up the nerve pathways toward the spine until they encounter a specialized type of nerve cell called an interneuron. Interneurons connect multiple nerves at the spine, and they act like gates, controlling which messages get through to the deeper structures of the spine and brain.

- Interneurons open the gate to comfortable sensations and close the gate to painful stimuli. This is called the gate control theory of pain.

- The spine has three important jobs in managing the pain signal:

 1. It manages your automatic motor responses to pain by sending the appropriate signal to the motor neurons near the site of injury.

 2. It sorts through all the different signals from your peripheral nervous system and prioritizes them.

 3. It sends the signal on to your brain.

THE BRAIN AND PAIN

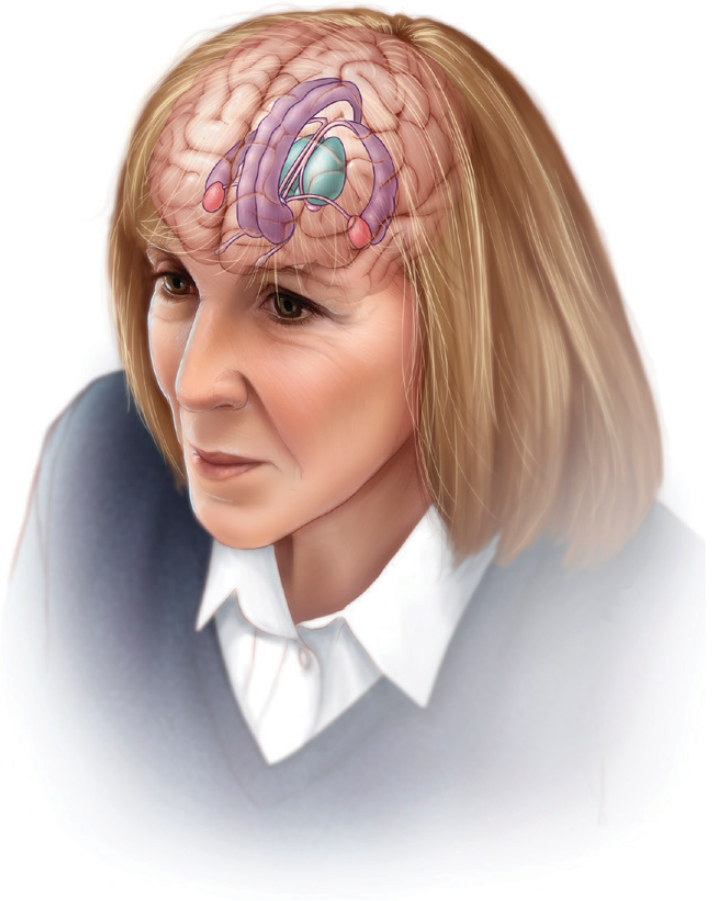
- The brain is where pain becomes extraordinarily complex, because it's no longer just a physical phenomenon. The emotional and cognition centers of the brain also get involved.

- The pain signal's first stop in the brain is the thalamus, which consists of two roughly egg-shaped structures—one in each hemisphere of the brain—that sit right above your brain stem. They act like a junction box or switching station, routing sensory input to all the other parts of the brain, specifically to the somatosensory cortex, hippocampus, and hypothalamus.

- The somatosensory cortex, the physical sensation region, is a band of neurons in the cerebrum that runs from ear to ear over the top portion of your brain. This region processes all incoming sensory information, not just pain signals.

- Different areas of the cortex correspond to different areas of the body as well as different types of information. This is how you know where you are injured and the type of injury, such as burning, cutting, stinging, or any other type of pain.

- The limbic system, on the other hand, is where the brain processes emotions. Someone's initial emotional reaction to pain may be obvious; the person might cry out, jump, or simply shrug it off. You



might think this is an objective measurement of the severity of the pain, but an individual's prior painful experiences can affect the perception of pain.

- The second job of the limbic system is regulating the endocrine hormones and autonomic nerves. That means that pain signals received by the limbic system can ultimately affect your heart rate and breathing. It may make you agitated or tired, dizzy or nauseated, anxious or enraged. But through controlling heart rate, it also controls the flow of blood, which sends pain-suppressing

chemicals and tissue-repairing factors to the site of injury, helping initiate the healing process.

- The third essential function of the limbic system is forming memories—all sorts of memories, not just memories of pain. But pain memories can be important. They're how we learn that fire will burn us and knives can cut us. While those pain memories can do us some harm—such as making us anxious at the dentist—overall, they exist to keep us out of harm's way.

- Our feelings and memories of pain interact with the third region of the brain: the frontal cortex. Essentially, this is where thinking and learning take place. The way you think about pain controls how much pain you expect to feel in any given situation, as well as what you do about it. In this way, your frontal cortex can raise or lower your response to pain.

- These and many more unique features of your physiology and personality—from your attention span to your overall health—can affect the way your brain processes pain. It's an incredibly complicated and individual process.

- Pain is a very real experience. It's not something that's imagined, or "all in your head"—although we do know now that your mind has much more to do with your pain than you may realize. There's no way to disentangle the tissue damage that causes pain from your brain's experience of it.

- Pain—at least acute pain—is essential to our survival. People who are unable to feel pain as most of us do reveal the very real problems of a life lived without pain. They have many injuries that result because they don't know that they are hurt.

CHRONIC PAIN

- Chronic pain is typically defined as persistent pain lasting for three months or longer. Unlike acute pain, which usually has a very

obvious cause, chronic pain's cause may or may not be obvious. It can result from ongoing tissue damage, can persist after an injury or illness that triggered the pain has healed, and can occur in the absence of any evidence of illness or injury.

- It makes sense that ongoing damage would cause pain, but what about the latter two cases? Why does a person still experience pain once the damage has healed or when there seems to be no damage in the first place?

- This has long been one of the great mysteries of neuroscience. For much too long, people who complained of pain that had no apparent cause were called hypochondriacs or attention-seekers. However, we now know that this is not the case. This type of chronic pain is real.

- Magnetic resonance imaging (MRI) has helped us see how experiences change our brains in all kinds of ways. In pain studies, we can see structural differences between the brains of pain-free subjects and patients with particular types of chronic pain. It doesn't matter whether you can attribute this pain to tissue damage or not—the brain changes are real.

- In some cases, chronic pain results from damage that lingers from an injury, infection, or surgery that has already healed. This type of chronic pain is called neuropathic pain, and there are two general types: peripheral neuropathy, which indicates damage within the peripheral nervous system, and centrally mediated pain, which indicates damage within the central nervous system (the brain or spine).

- One of the most common forms of neuropathic pain is diabetic peripheral neuropathy. Over time, high blood sugar results in nerve damage, most often to nociceptors in the feet and legs. Patients with diabetic peripheral neuropathy will often feel numbness, tingling, or burning in their limbs. They can experience cramping or increased sensitivity to touch.

- This is called allodynia. Strength and reflexes diminish, as do balance and coordination. This hyperalgesia, or increased sensitivity to pain, prevents the patient from recognizing when real damage is occurring, resulting in infections and other damage.

- Why this happens is still an open area of research. If there is no known neurological damage, one theory is that these patients are experiencing a disorder called central sensitization. When pain signals are transmitted from injured or diseased tissue, other nerves can be activated, or sensitized, by that signal. Somehow, in these patients, other neural circuits send pain signals.

- Central sensitization can affect more than just the nociceptors. It can make all kinds of sensations very difficult to tolerate.

- The exact mechanism that causes sensitization is not yet understood, but a great deal of research is being devoted to finding both the cause and appropriate treatments for this kind of pain. We believe that understanding sensitization will help us better understand, and better treat, all types of pain.

VIRTUAL REALITY AND TENS

- Even though pain is real, it exists partially as an electrical signal in your mind, and your mind can be taught to respond to that pain signal differently. The key is attention.

- Virtual reality seems to take some portion of our attention—attention that would otherwise be focused on pain—and divert it. It "turns down the volume" on the pain signals not by changing the pain itself, but by changing what you're focused on. Some researchers are integrating virtual reality with biofeedback in programs to enhance mindfulness and resilience.

- As virtual reality becomes more mainstream—with some basic commercial systems costing less than a thousand dollars—we can expect this kind of therapy to start turning up in a clinical setting

soon. But much more work needs to be done on the use of virtual reality technology in chronic pain.

- Virtual reality units work on the central nervous system—the brain itself. But it's also possible to alter the pain experience in the peripheral nervous system, again without the use of heavy medicines.

- Transcutaneous electrical nerve stimulation (TENS) is the use of electricity produced by a small device that has electrodes hanging off of it. You attach the electrodes to your skin near the site of your pain and use the device to send a small and painless but noticeable electrical signal through your skin to the nerves near the site of pain.

- There are several theories about what happens next. One is that the electricity stimulates production of endorphins, your body's natural painkilling chemicals. Another theory is based on the gate control theory of pain. The electrical signals from the TENS unit may disrupt the pain signals from your nociceptors, overwhelming that signal with a different kind of stimulation.

- Like virtual reality, TENS can't work miracles. It also doesn't work for everyone. But it's interesting to researchers because it's further support for gate control, and like virtual reality, it points us in the direction of further research.

- We can disrupt pain signals without medication. Your nerves can be retrained—temporarily for now, maybe for longer periods of time in the future.

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LECTURE **3**

COMMON CAUSES OF CHRONIC PAIN

So far, you've learned in general about chronic pain. This lecture is about the specific conditions that might lead to chronic pain. You will learn about chronic back pain, headaches, and chronic abdominal pain. You will also learn more about central sensitization, including causes of it and treatment for it.

CHRONIC BACK PAIN

- Among people with chronic pain between the ages of 20 and 64, the most commonly reported condition is back pain. It accounts for a little more than a quarter of chronic pain conditions. Many different physical conditions can lead to back pain, and most of them don't become chronic.

- The National Institutes of Health divides the causes of chronic back pain into four general categories: mechanical problems, injuries, acquired conditions and diseases, and infections and tumors.

- The mechanical problems are probably the most common. They include the chronic form of muscle strain and spasm, but they also include herniated or ruptured discs.

- Between each of your vertebrae is an intervertebral disc made of two components: The outer layer is made of flexible, elastic tissue called the annulus fibrosus, and the inner layer is made of a gel called the nucleus pulposus.

- When these discs bulge out of place or tear open, the nerves leading from your spine to your peripheral nervous system can become compressed. Sometimes you don't notice this pressure, but sometimes you feel tingling, numbness, or pain. Sometimes the discs heal themselves; sometimes the pain becomes chronic.

- Injuries, such as fractures and sprains, and acquired conditions, such as osteoarthritis and rheumatoid arthritis, round out the most common causes of back pain. Infections and tumors are very rare.

- Some cases of back injury may require surgery, but this is not the first or preferred treatment for the majority of people with back pain.

- Our understanding of the causes of back pain is getting better, but the treatments are not necessarily improving outcomes.

- The best defense against chronic back pain is to stop it before it starts. Many of these conditions can be linked to weakness, misuse, or overuse of the back and abdominal muscles or to the normal wear and tear of aging. It's important to keep these muscles strong with regular activity.

- If your pain has already become chronic, the prescription is much the same: stronger back and abdominal muscles. The difference is that you will need to strengthen these muscles more slowly and carefully.

- What you shouldn't do is rest, at least not for long. It's important to retain and gain muscle mass to stay healthy. Always consult a doctor before starting any kind of physical therapy program.

HEADACHES

- Headaches are the second most common cause of chronic pain in the United States. You are probably familiar with acute headaches, but for some people, headaches are frequent and severe enough to disrupt their lives. Two of the most common types of chronic headaches are tension-type headaches and migraine headaches.

- Tension-type headaches are usually caused by stress, which can be long term or short term. In other words, the stressful trigger may not be the situation immediately in front of you but a long-term buildup of stress.



- The first thing to do is to identify and, if possible, remove the source of stress. Sometimes, that's easier said than done. Sometimes we have more than one source of stress in our lives, and sometimes these stressors are beyond our control.

- Another common type of headache is migraine. Symptoms of migraine include not only throbbing pain but also nausea and visual distortions known as auras.

- The cause of migraines isn't fully understood, but they may be neurological, hormonal, or environmental. Different sufferers report different triggers, and some people can't figure out exactly what triggers their attacks.

- If you experience migraines, one of the best things you can do is try to keep a record of when and how each migraine begins. Try to find a pattern and identify anything that might have set the migraine in motion, such as foods, weather patterns, or medications.

- Both tension headaches and migraine headaches are often treated by two methods: trigger avoidance and over-the-counter pain medication. But if you can't manage your migraines with these methods, prophylactic medications are available. A pain management program can also help and may reduce your need for medication. Talk to your doctor about what's best for you.

- We're now discovering that people may be putting themselves at risk for rebound headaches if they use combination analgesics, ergotamine, or triptans 10 or more days a month or use simple analgesics more than 15 days a month—especially if this regular use continues for three months or more. This is a form of hyperalgesia in which your medication is causing pain rather than relieving it.

- If you and your primary care provider have exhausted the options for dealing with your headache, a neurologist specializing in headaches may be helpful to you.

CHRONIC ABDOMINAL PAIN

- A third common type of chronic pain is chronic abdominal pain, which is defined as abdominal discomfort lasting for at least six months. It can be continuous or intermittent. The cause might be functional or organic.

- Organic abdominal pain has a clear anatomic, physiologic, or metabolic cause, such as Crohn's disease, peptic ulcer disease, and gallbladder disorder. Functional abdominal pain syndrome is the name given to abdominal pain that accompanies no change in bowel habits and has no clear source of pain.

- If you do have a change in bowel habits but there are no abnormalities in your imaging or bloodwork, your doctor may say that you have irritable bowel syndrome (IBS). Studies estimate that IBS affects up to 23 percent of U.S. adults, but only about 12 percent of people with IBS ever report their symptoms to a health-care provider. Even though people don't report it, it causes high rates of absenteeism from work and school and as much as 30 billion dollars in direct and indirect health-care costs per year.

- Perhaps people underestimate the importance of dealing with chronic abdominal pain because they underestimate the importance of overall gut health. It might surprise you to know that there are more neurons in your gut than in your nervous system.

- You are host to trillions of other organisms—microorganisms, mainly bacteria, that live inside your digestive tract. Far from being parasites, they are an essential part of your immune system. When you have a healthy microbiome, your gut functions well. When you have an unhealthy microbiome, all kinds of things may go wrong, not just in your digestive system, but all over your body.

- The research in this area includes work with dietary supplements, fermented foods such as yogurt, and even fecal transplants. But

the big trend is identifying items in our diets, such as gluten, that might be causing abdominal pain.

CENTRAL SENSITIZATION

- But what if dietary changes or probiotics don't help your symptoms? What if you can't pin down any organic cause for your abdominal pain?

- Think about all those nerve endings in your gut and the fact that they are exposed to a lot of environmental stress. They're exposed to food, drink, bacteria and viruses, and medicine; anything you swallow will pass by those nerves at some point.

- With sensitization, excessive stress can "turn up the volume" on a pain signal, amplifying it and distorting it, even in the absence of any painful stimulus. This can happen anywhere in the body, but research has shown that the phenomenon of central sensitization—sensitization of the brain and spinal cord—may be the culprit in a number of previously mysterious conditions, including IBS.

- Mayo Clinic defines central sensitization formally as a dysregulation of the thalamus, hypothalamus, and amygdala, plus alterations in pain and sensory processing, which leads to a multitude of symptoms.

- The thalamus sends the pain signal to the thinking, feeling, and acting regions of the brain, so your body can do what it needs to do to start the healing process. We know that if something's gone wrong with the thalamus, then something's gone wrong with the way we're experiencing pain.

- Along with the thalamus, the hypothalamus and amygdala make up the majority of the limbic system, which has three big jobs: It is the emotional center of the brain, affects how you form memories,

and regulates the autonomic processes of your body, from breathing to healing.

- The limbic system not only receives signals from the body, but it also sends signals back to your body, via the peripheral nervous system. Through those signals, it can make your body react, and it secretes endocrine hormones.

- Your nervous system has two parts: the peripheral nervous system and the central nervous system. Problems in the central nervous system play a big role in central sensitization.

- It's not just the limbic system that's dysfunctional in central sensitization. Other parts of the brain are also involved. We have proof of this from magnetic resonance imaging (MRI) of people with and without central sensitization.

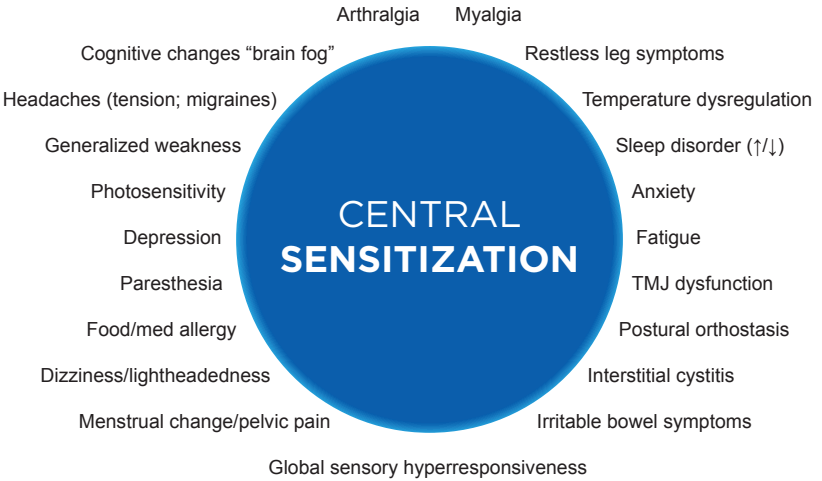
- MRIs show that in people with central sensitization, more of the brain is dedicated to processing pain. The areas that are supposed to "light up" light up, but so do other nearby areas.

- The connections between these brain regions also change. You might guess that someone with central sensitization has more connections between the pain-sensing regions of the brain, but they actually have fewer connections, and more direct connections.

- There are a number of different chronic pain disorders that we now believe are caused by central sensitization, including IBS, chronic fatigue syndrome, and complex regional pain syndrome. The classic form of central sensitization is called fibromyalgia.

- Researchers have identified a group of about 20 symptoms related to central sensitization. Mayo Clinic has incorporated these symptoms into the Circle of Central Sensitization, and the model that is used comes from Dr. Arya Mohabbat.

THE MOHABBAT CIRCLE OF **CENTRAL SENSITIZATION**



- About half of the symptoms fall into the broad category called pain. Fatigue is one of the most common symptoms, and often it’s the symptom that brings people to the doctor in the first place. Mood disorders are also associated with central sensitization. Patients with central sensitization often display global sensory hyperresponsiveness; their bodies seem to overreact to stimuli in their bodies, including foods and medications, or in the environment, whether or not a formal allergic reaction is involved.

CAUSES OF CENTRAL SENSITIZATION

- What causes central sensitization? Did the symptoms exist first, or did the neurological issue exist first? We don’t really know. Research has identified more than a dozen different factors that play a part in the development of central sensitization. We can identify several of these factors in any given patient.

- Very often, a single triggering event—such as a serious infection or chemical exposure, a car accident, a surgery, a rheumatic disorder, or a psychological stressor or trauma—brings all the other symptoms to the forefront.

- Good sleep is crucial for good physical and psychological health. Sleep disturbances can cause significant neurological problems leading to central sensitization.

- A tendency toward hypersensitivity of the peripheral nervous system may be a cause, rather than a symptom, of central sensitization.

- People with central sensitization may have something called a pain-prone phenotype. A person with a pain-prone phenotype experiences more pain.

- Some people with central sensitization have a family history of chronic pain, indicating a genetic influence in the disorder. Environmental factors might bring about these symptoms. And an underlying mood disorder could be either a cause or a symptom of central sensitization.

TREATMENT FOR CENTRAL SENSITIZATION

- Because the core of the problem with central sensitization is an overstimulated or overburdened nervous system, the focus for treatment is on techniques that settle down the nervous system, including sleep, relaxation, exercise, moderation, and pacing.

- But because people with central sensitization have an overstimulated nervous system, doing too much too soon can cause a pain flare. This crash-and-burn phenomenon occurs frequently and can last for days to weeks. It's important to start slowly and increase slowly, to set moderate goals, and to not attempt to push past them.

- For central sensitization, medication is a mixed bag. Some of the medications people with central sensitization try for their pain can actually make their pain worse.

- There are three FDA-approved medications for the treatment of fibromyalgia, and they may be useful for other forms of central sensitization: pregabalin, also known as Lyrica, an anticonvulsant; duloxetine, also known as Cymbalta, an antidepressant; and milnacipran, also known as Savella, an antidepressant.

- Each of these might be of some help for chronic pain, but each of them comes with side effects, so it's important to weigh the pros and cons carefully, especially if you're prone to medication hypersensitivity.

SUGGESTED READING

Arthritis Foundation, "What Is Arthritis?"
Camilleri, "Peripheral Mechanisms in Irritable Bowel Syndrome."
Clauw, "The Science of Fibromyalgia."
National Headache Foundation, "Headache FAQ."
National Institute of Arthritis and Musculoskeletal and Skin Diseases, "Handout on Health."
Steeds, "The Anatomy and Physiology of Pain."
The American Academy of Pain Medicine, "AAPM Facts and Figures on Pain."
van Griensven, et al, Pain.
Westlund, "Pain Pathways."
Yunus, "Role of Central Sensitization in Symptoms beyond Muscle Pain."

LECTURE **4**

MEDICATION FOR CHRONIC PAIN: WHY AND WHY NOT

This lecture is about using medications—also known as pharmacotherapy—to treat chronic pain. Medications play an important role in treating chronic pain, but they're not the be-all and end-all of pain management. The good news is that we now have many more options to deal with pain than we did just a few decades ago. The bad news is that it can be confusing when you're confronted with all the options. In this lecture, you will discover some of the benefits, risks, and new frontiers of medication-based pain management.

OPIOIDS AND CHRONIC PAIN

- Chronic pain is different from acute pain in two ways.

 1. There doesn't have to be any obvious cause for the pain. It can be lingering pain from a healed injury, pain that's out of proportion to an injury, or pain that seems to come out of nowhere.

2. A nervous system dysfunction of some kind may be involved in various types of chronic pain. This is called sensitization or upregulation, and it can happen in the central nervous system (the brain and spinal cord) or in the peripheral nervous system (the network of nerves running throughout your body).

- Everyone experiences acute pain. It's not enjoyable, but it's a necessary part of life, and most people know how to handle the small stuff, such as headaches. Acute pain can be more serious, such as surgical pain or pain from a serious injury. For these conditions, the medications—the narcotic medications called opioids—get stronger.

- The best-known opioids include morphine, hydrocodone, oxycodone, and fentanyl. According to the Centers for Disease Control and Prevention (CDC), health-care providers write more than 250 million prescriptions for opioids every year. There is plenty of evidence that the use of opioids in the short term (for three days up to three months) is safe and beneficial for the majority of patients with acute pain.

- Chronic pain is pain that lasts more than three months, which is beyond the known safety limits for opioid medications.

- The CDC has found that long-term use of opioids led to addiction and tolerance and that both of these sharply increased the risk of overdose. The CDC advises that physicians:

 - not prescribe opioids as first-line or routine therapy for chronic pain outside of active cancer, palliative care, and end-of-life care;

 - evaluate the benefits and risks of opioid use one to four weeks after a patient starts opioid therapy and every three months or more often for continued use of opioids;

 - help their patients use other therapies for pain management if they find that opioids are more harmful than they are beneficial



and taper opioids to lower doses or gradually discontinue their use; and

- □ use the state's prescription drug monitoring program—either with every new prescription written or every three months—to review the patient's history of controlled substance prescriptions to determine if the patient is receiving doses of opioids or combinations of opioids and other prescription medications that increase the risk for overdose.

DRUG THERAPY

- ■ Surprisingly, physicians have a limited armamentarium with regard to what to use for pain control. There are nonsteroidal anti-inflammatory drugs, opioids, and local anesthetics. Beyond these, there is little else except for adjunctive medicines that can sometimes be used for specific issues.

- Nonsteroidal anti-inflammatory medicines have a ceiling effect: If you take a certain dose, it gives you a certain response. If you take twice that amount, you're not going to get twice the response. Taking more than what's recommended will only lead to more side effects and to more likely injure yourself. Nonsteroidal anti-inflammatory medicines can cause kidney problems and fluid retention and may affect your blood pressure.

- Aspirin is a nonsteroidal anti-inflammatory drug, but it is different. Aspirin can be more toxic to your stomach lining.

- Acetaminophen is not an anti-inflammatory medicine. The issue with acetaminophen is that it can cause more problems with liver toxicity, yet it's safe on the stomach.

- If you cannot take an anti-inflammatory because of other medical issues, then you might have to reach for opioid medications. These medications are used for acute episodes of pain, and the use of opioids for chronic pain may not be in your best interest beyond a few months. But sometimes pain is serious and you may have significant problems that drive you to use these medications.

- Opioids can lead to constipation, nausea, overall somnolence, and respiratory depression.

- An interesting property of opioids is dependence. If you stop taking the medication, you may get some physical sign that you have stopped taking it and feel like you need it. You also may experience tolerance. As time goes on, your body gets used to taking the medication, and the dose has to be increased to get the same effect.

- As you rapidly escalate opioid medications, you can get an opioid rebound effect, or opioid hyperalgesia. By increasing the dose rapidly, the body responds in a way to facilitate pain rather than decrease pain, and in many ways, it mimics the tolerance that you experience with opioid medications.

- Opioids aren't a great long-term solution for chronic noncancer pain. Scientific research is looking for better options. For now, a number of other medications that weren't particularly made to treat pain are used because they have been found to help pain. These include antidepressant and antiepileptic medications.

- Antidepressant medications can be helpful in relatively low doses, much lower than what is used to treat depression. Antidepressant medicines may also downregulate some of the flow of information to the brain. They also may enhance the ability of your body to suppress pain.

- Antiepileptic medications can be helpful in pain related to nerve damage.

- There are a number of risks regarding antidepressant and antiepileptic medications. Most of them may cause nausea, dizziness, or drowsiness, especially antiepileptic medications. They may cause further depression; there's an increase of suicide in people who take these medications. If you feel depressed, you should tell your doctor right away.

- There are a number of different topical medications for pain. Topical local anesthetics such as Lidocaine help block some of the pain impulses on the surface of the skin. Topical medications called counterirritants produce increased blood flow to an area around a joint that makes it feel better.

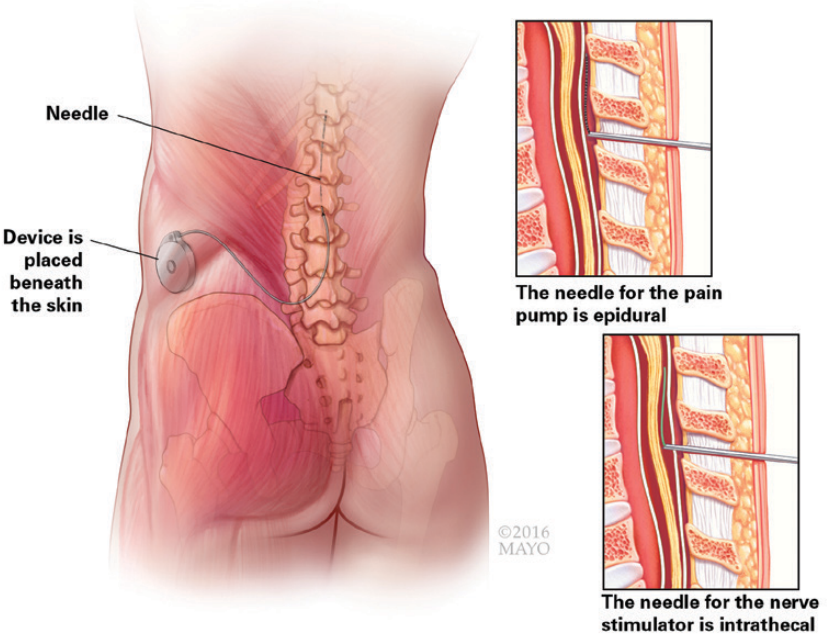
- There is also a prescription anti-inflammatory patch that can be placed over a particular area or joint that may be affected. This patch has been found to be helpful in decreasing some of the side effects associated with ingesting oral medications.

- In addition, injection therapy can be helpful. In addition to helping the patient feel better, injections can be helpful diagnostically. Sometimes it's difficult to figure out exactly what is bothering a patient, and if a doctor injects an area where a person is having

pain and he or she has immediate relief, the doctor can be fairly confident that he or she has identified the issue and is more likely able to identify different ways to help treat the pain.

- Corticosteroids are typically added to the injection. Corticosteroids can cause a number of problems. They can affect your immunity. Doctors must be careful where they inject patients, because injecting around a tendon or ligament can weaken it. Corticosteroid can aggravate diabetes for a number of days after injection. You don't want to get too many of these injections too frequently over too long a period of time.

- For treating the area around the spinal cord, an option is providing electrical impulses in the epidural space, the area just outside the spinal cord with the spinal fluid. Electrodes are implanted in the



epidural space near the area where the nerves come in that are affecting your particular pain. The electrodes can be programmed from a small battery pack that is also implanted that can provide impulses to interrupt the flow of messages from your spinal cord to your brain, where you perceive the pain.

- This technology has improved dramatically over recent years. One of the advantages of such a device is that it contains no medications. Many of these devices are rechargeable through the skin, so you never have to have these devices replaced. The ability of these devices to help with chronic pain over the long term is growing.

MANAGING YOUR MEDICINE CABINET

- There are four steps you can take to prevent harmful drug interactions:

1. If you see different doctors, each of them needs to be aware of all the medications you're taking, including over-the-counter medications, such as aspirin, allergy medicine, and nutritional supplements.

2. Order all of your medications through the same pharmacy whenever possible. The pharmacy has systems in place that alerts pharmacists to potentially dangerous interactions between the drugs you're taking.

3. When you pick up a prescription from the pharmacy, it comes in a bag with a piece of paper stapled to it. Read the piece of paper to keep yourself informed of any potential side effects so that you can monitor your own response to the medication.

4. Dispose of old medications properly. Medication loses its effectiveness after a certain amount of time, and its effects become unpredictable. Also, a large part of the opioid abuse crisis is driven by people taking medications that don't belong to them. Do not flush your medications down the toilet and

into your city's water system, and do not put them straight into the trash.

- You can ensure that you're properly disposing of your unused medication by:
 - asking local law enforcement agencies about medicine take-back programs in your community;
 - calling the trash and recycling service in your city or county to find out about medication disposal options and guidelines for your area; and
 - contacting the Drug Enforcement Administration, or your nation's equivalent, to find an authorized site (such as retail, hospital or clinic pharmacies, law enforcement locations, or even mail-back programs) that collects unused medicines.



- If your medication doesn't come with disposal instructions and there's no take-back program in your area, take these steps to dispose of your unused medication:

 - Remove your pain medication from its original container and mix it with something undesirable, such as used coffee grounds, dirt, or kitty litter. Put this mixture into a sealable bag and then dispose of it in the trash.

 - Remove any information on the prescription label that identifies you.

 - Don't give your unused medicine to your friends. What your doctor prescribes for you may not be safe—and can potentially be dangerous—for someone else.

OPIOID ABUSE

- If you or a loved one is currently taking opioid medications, be alert for the signs of opioid abuse. Here are some of the things to look out for:

 - You find yourself regularly taking more than the prescribed dose.

 - You find yourself taking pain medication "just in case," even when you're not in pain.

 - You find your moods changing.

 - You find yourself seeking the same prescription from multiple doctors to have a backup supply.

 - You find yourself "borrowing" medication from other people or using medication prescribed for someone else.

- If taking your medication becomes the center of your life, rather than it enabling you to live your life, talk to your doctor about how the medication is affecting you.

- If you've become dependent on these drugs, your doctor will help you taper off them slowly. Don't try to quit cold turkey on your own. It's not just a recipe for failure; there are potential serious consequences to your health. Work with your doctor to develop a plan to get off opioids and replace them with smarter, safer pain management options.

- A philosophy that many doctors are coming to share is that the best use of pain medication is the least use of pain medication. After working with their doctor on a comprehensive treatment plan, many patients choose to live their lives without pain medication.

SUGGESTED READING

Brune, et al, "New Insights into the Use of Currently Available Non-Steroidal Anti-Inflammatory Drugs."

Centers for Disease Control and Prevention, "CDC Guideline for Prescribing Opioids for Chronic Pain."

Felicilda-Reynaldo, "Recognizing Signs of Prescription Drug Abuse and Addiction."

Institute of Medicine, *Relieving Pain in America*.

Lynch, "The Pharmacotherapy of Chronic Pain."

LECTURE **5**

HOW EXERCISE HELPS WITH CHRONIC PAIN

There was a time, not so long ago, when people who had chronic pain were told to avoid exercise and exertion. Practitioners thought that their patients might do themselves more harm than good by aggravating injured joints and muscles. Now we know that the opposite is true: Exercise not only improves people's overall health, but also actually reduces pain symptoms and improves their quality of life. In this lecture, you will learn how to make exercise work for you.

GUIDANCE

- Exercise produces many health benefits. It releases endorphins and enkephalins, the body's natural painkillers and feel-good hormones. It improves blood flow to the brain and reduces fatigue. It improves the quality of your sleep. It may even reduce the risk of Alzheimer's disease and certain forms of cancer. New research demonstrates how exercise can help you build emotional resilience as well as physical strength.



- When it comes to starting an exercise program, advice should be customized to your particular needs with the help of your doctor, as well as a professional physical therapist or trainer. There are three different types of trainers that might be helpful to you, depending on your specific needs: physical therapists, occupational therapists, and certified exercise therapists.

 1. A physical therapist is trained in the use of exercise to achieve physical fitness or rehabilitation from injury.

 2. An occupational therapist will help you learn how to safely perform everyday activities—such as lifting, reaching, and even getting dressed—without aggravating your injury or pain.

 3. A certified exercise therapist, much like a physical therapist, is trained in helping you achieve general physical fitness,

but these therapists work outside the clinical setting, usually in gyms and health clubs. A certified exercise therapist is different from a personal trainer and has more expertise in dealing with injured individuals.

- When patients come to Mayo Clinic's Pain Rehabilitation Center, they work with a physical therapist every day for three weeks. Therapists evaluate their needs and help them set goals. Therapists teach them the appropriate way to perform exercise routines and how to know when they're ready to raise the level of intensity. At the end of three weeks, the goal is for patients to be able to do the exercises on their own, without a trainer.

- Most of the time, physical therapy focuses on a specific injured body part. But the physical therapy and exercise component in Mayo Clinic's pain rehabilitation program is different. Instead, the core of the program treats the whole person.

- When we live with pain, especially chronic pain, we tend to become inactive. This inactivity may not be causing the chronic pain, but it can feed into the chronic pain in several different ways: It can lead to poor endurance, weakness, overall fatigue, and maladaptive behaviors (behaviors that help you cope with one problem but, in doing so, cause another problem).

- Mayo Clinic therapists work to address inactivity and poor endurance as well as any maladaptive behaviors you've developed to manage your pain. They want to create a program that not only deals with the site of pain and any adaptations you've gotten used to, but also one that promotes general physical fitness and well-being. They want you to be strong enough to live your life.

- Of course, you're going to tell your therapist about the specifics of your pain, but before you even meet with a therapist, you need

to talk to your primary care provider. This is especially important if any of the following applies to you:

- □ You have heart disease.
- □ You have asthma or lung disease.
- □ You have type 1 or type 2 diabetes.
- □ You have kidney disease.
- □ You have arthritis.
- □ You are being treated for cancer, or you have recently completed cancer treatment.

- If you have a personal health history that may impact your exercise plan, talk to your doctor first. You want to make sure that you're taking part in the types and amounts of exercise that are best for you—not just to make sure that it's safe for you, but also to make sure that you're getting every possible benefit you can out of your physical activity.

PHYSICAL THERAPY FOR CHRONIC PAIN

- Mayo Clinic's Pain Rehabilitation Center helps patients who are dealing with chronic pain anywhere in their body and teaches them how to deal with their pain and how to move on with their life despite the pain. The average patient has had numerous trials along the way, including physical therapy, injections, and different medications.

- There are three main aspects to the exercise regimen: aerobic conditioning, strength training, and flexibility.

 1. Aerobic exercise, which is anything that challenges the heart and breathing muscles, builds endurance and stamina.

2. On average, people dealing with chronic pain are deconditioned because the pain has put them down. They are not interested in moving a painful site of their body, so they are losing muscle tone. The structural tone of their muscles needs to be rebuilt to support their body and skeletal system.

3. People who have not been active for a while because of their chronic pain develop stiffness (increasing their levels of pain), and movement patterns change. They're not moving their body correctly, so the goal is to increase flexibility throughout their body. Greater flexibility also decreases risk of further injury because they can move into greater depths or do more activities.

- On average, people dealing with chronic pain also experience significant fatigue, which often takes over their body. They become less and less active because they are doing fewer aerobic types of activities. Aerobic exercise helps rebuild endurance and stamina, and each person individually needs to work with a physical therapist to identify what will work best for them.

- With regard to strengthen training, the first step is to figure out how much strength the person has, so that progress can be measured. Start with a very conservative amount of weight and gradually increase it. You can use dumbbells, elastic band equipment for resistance, or isometrics (where you repetitively tense up the muscles and hold it for several seconds and then relax). Take a holistic approach, involving exercises for your upper body, lower body, and core.

- Aerobic exercise, which is any kind of exercise that makes your heart work harder and faster and makes you breathe harder, includes exercising on a stationary bike, treadmill, or elliptical machine. You could also simply put on a good pair of tennis shoes that offers support and go for a walk. There are many different ways of doing some form of aerobic exercise. The recommended

amount is four to five days per week of aerobic exercise, gradually working up to 20 to 30 minutes of nonstop exercise.

- It's important to have patience when it comes to physical activity. You are not going to achieve your goals overnight or even over several weeks. It can take months of regaining strength, endurance, stamina, and flexibility.

- For people dealing with chronic pain, starting with gentle forms of exercise and gradually building from that helps them achieve what they want out of life once again.

MODERATION

- When starting an exercise program, moderation is important. You can't just push yourself to your absolute limits at the very start. The longer you've been in pain, the more deconditioned you are. It becomes a vicious cycle: You hurt, so you do less, so the next time you try, the pain is worse, so you try less often, and so on. You suspect that your condition is getting worse, when in fact it's your overall conditioning that's causing the problem.

- Some patients with chronic pain experience hyperalgesia and central sensitization. That means that their nervous systems, particularly their pain nerves, are upregulated and more active than those of other people. They become fatigued and sore more easily, and their deconditioning is a bit more difficult to overcome, at least at first.

- Many people, especially those with fibromyalgia, have a tendency to overdo it for one reason or another, which only makes things worse. Recovery then takes longer than it should, and it's more difficult again the next time they try. Again, there is a vicious cycle—not because of not trying, but because of trying too hard.

- Shoot for moderate activity every day. Travel at cruising speed—not too fast, not too slow.



SMART GOALS

- Where are you right now in terms of physical strength and endurance? How is your level of deconditioning affecting your pain and the quality of your life? How could a physical therapy or general physical fitness program help you manage your pain?

- When you design your goals, they should meet all five of these criteria: specific, measurable, attainable, relevant, and time-limited (SMART).

 - **Specific**: Get specific. Do you want to exercise more frequently? Do you want to be able to do a certain activity or task?

 - **Measurable**: Set a duration and frequency—for example, 30 minutes once a day—by determining how often, how much, or

how far you want to exercise. What are the benchmarks you'll use to keep yourself on track?

- **Attainable and relevant**: Consider both the short term and the long term. Is this really something that benefits both your immediate health goal and your life overall? You may need to consult a doctor or trainer with help on this, or you may not. Just make sure it's a plan that not only fits into your lifestyle now but also will work into all your plans for the future.

- **Time-limited**: Complete your goal by a specific date. Put a specific time limit on it. Think about some upcoming event that you can tie the goal to. Make it something that's a few months out so that you have time to work your way there. Whatever your fitness goal is, you're going to reach it on or before the deadline you set for yourself. That deadline will motivate you even when you're struggling.

- Once you have a physical fitness SMART goal, write it down and put it somewhere where you'll see it every day. Working on better physical conditioning is something you can do today, one step at a time.

SUGGESTED READING

American Chronic Pain Association, "The ACPA Resource Guide to Chronic Pain Medication & Treatment."

Geneen, et al, "Physical Activity and Exercise for Chronic Pain in Adults."

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LECTURE **6**

MANAGE YOUR STRESS TO MANAGE YOUR PAIN

When it comes to pain, there are many limitations with conventional treatment, so integrative medicine is often recommended. If you're trying to improve your pain and take better care of yourself, it makes sense to be as healthy as possible, especially with regard to nutrition and exercise. An integral part of being healthy is stress management. Mayo Clinic uses many different mind-body approaches, including meditation, yoga, tai chi, and guided imagery, that help people reduce stress.

THE STRESS RESPONSE

- Your body comes hard-wired with an alarm system for your protection, called the fight-or-flight response. When you encounter a threat, your body automatically musters the strength to do one of two things: get you out of harm's way or defeat the foe.

- This means producing a cascade of hormones that puts your body into overdrive. Like the pain response, this is an autonomic process, and as an autonomic process, it starts in the limbic system.

- Sensing a threat works very much the same way that sensing pain works. And that's logical, because pain is a type of threat.

- Your senses perceive a stimulus—in this case, a threat. It doesn't matter whether they see it, smell it, hear it, or feel it; the sensory information travels from the peripheral nervous system into the brain and makes its way to the limbic system.

- Part of the limbic system's job is controlling the autonomic processes of the body—such as heart rate, breathing, and hormone secretion—so when a threat signal reaches the limbic system, the limbic system turns on the appropriate autonomic systems. It activates the hypothalamic-pituitary-adrenal (HPA) axis.

- The adrenal glands sit on top of your kidneys. When the stress response is activated, the adrenal glands release a surge of hormones, including adrenaline. These hormones make your heart beat faster, which brings blood to the muscles. Your blood pressure increases. Your breathing becomes faster and shallower, so you take in more oxygen.

- Then your nervous system also springs into action. Your muscles tense up. You start to sweat more.

- All of this happens in an instant, readying you to confront or flee that threat by giving you a quick burst of energy.

- But stress is stress to your body. You might know the difference between your screaming kids and a rampaging lion, but your body can't tell them apart.

- The fight-or-flight response is not a bad thing. The elevated stress hormones speed up your reflexes and related autonomic processes, allowing you to act quickly and decisively, almost without thinking, when a crisis arises.

- The problem occurs when stress is frequent or prolonged. It isn't good for your body to always be on high alert.

- One of the other hormones your body releases in response to a threat is cortisol. In fact, cortisol is your body's primary stress hormone. When your body responds to stress, cortisol releases glucose into your bloodstream, enhances your brain's use of that glucose, and gives your body more of what it needs to repair itself.

- Cortisol also curbs functions that aren't needed or could be harmful in a fight-or-flight situation. You only have so much energy to go around, so some system is going to lose out. Therefore, cortisol alters immune system responses. It suppresses your digestive system, reproductive system, and growth processes.

- If you're under sustained stress—maybe you are a soldier on the battlefield or are struggling with chronic pain—cortisol is the stress hormone that's running the show. But while cortisol helps you fight, it can also cause other unwanted health effects if it's secreted at a higher level for too long.

- When you're living with stress that doesn't seem to go away, effects such as higher blood pressure and faster heart rate cause wear and tear on your cardiovascular system.

- Sustained stress can also alter your immune system, making it more difficult for your body to fight off infections. Sustained stress can cause headaches, disrupt sleep, cause intestinal problems, and even trigger asthma attacks.

- While the stress response has its uses, we want to minimize the amount of stress in our lives. But to minimize it, we have to recognize it first.

- There is such a thing as good stress, sometimes called eustress, such as getting a new job or buying a new home. These are things

we look forward to, but they take a toll on us. They put us on high alert.

DEALING WITH STRESS

- No matter what type of stress you're dealing with, know that it will have an effect on your body. The first step to take to reduce that effect is to recognize your stress triggers. These might be external factors, such as your job or relationships, or internal factors, such as your behaviors or attitudes.

- It may be helpful for you to make a list. Brainstorm anything that comes to mind as a possible source of stress. Then, look over the list and ask yourself which of the items you can control and which you cannot. Try to address a few of the simpler things on the list.

- The more you can reduce your stress, the better you'll feel—not just emotionally, but also physically. The physical changes stress causes in the body also increase your experience of pain.

- Stress upregulates the nervous system, and an upregulated nervous system is bad news for pain. In addition, the physical changes triggered by stress are the same as those triggered by pain: tighter muscles, clenched jaw, faster heart rate, shallower breathing. Stress is additive to pain; you're doubling the symptoms.

- Part of the purpose of the stress response is to sharpen your focus on negative stimuli. This might be helpful when you're in immediate physical danger, such as being chased by a lion, but that's not how the stress response works these days. Although we probably aren't facing life-threatening danger in today's world, our brains still react like we are, and this response is especially unhelpful when what you're focused on is pain.

- As with stress, focus and attention are additive to pain. Shifting your attention away from your pain can lessen the experience of pain.



- Stress can change your behavior, and those behavior changes can add to your pain.

- People in pain are usually less physically active. Deconditioning can increase the experience of pain, and it can cause weakness that aggravates pain.

- But people in pain are also typically less socially active. Isolation is its own form of stress. The loss of structure and schedule is a form of stress. The loss of pleasure and joy is its own form of stress.

- We want to reverse this. We want to adopt new behaviors that lessen your stress, rather than add to it.

- Part of that process is getting your life and your surroundings organized. Getting the simple things under control means that you'll have more energy for dealing with surprises.

- Planning out your days with a written or electronic schedule helps keep you on task and on time. Keeping that schedule simple and delegating tasks whenever possible moves some of the stressful burden off your shoulders.

- Getting your home and office organized saves you time and reduces stressful emotions when it comes time to complete a task. Getting enough rest and exercise and eating a healthy diet give you more energy to get the tasks completed, so all of those need to be part of your daily schedule.

- Put relaxation on your calendar every day, twice a day, for 20 minutes at a time.

- There are a number of structured relaxation options, including the following:

 - relaxed diaphragmatic breathing
 - biofeedback
 - progressive muscle relaxation
 - guided visualization
 - meditation
 - yoga
 - tai chi

- Each of these is different, but they all use concentration and breathing to relax your body and autonomic nervous system. They decrease your heart rate, breathing rate, and all the effects of the stress hormones on your body.

INTEGRATIVE AND COMPLEMENTARY MEDICINE

- Another avenue worth exploring if you're looking to reduce stress is the world of integrative and complementary medicine—therapies that are considered effective but not part of mainstream medicine, such as massage, acupuncture, mind-body activities (meditation, yoga, tai chi), and dietary supplements, in addition to traditional medical therapies.

- Among the general public, these are often called alternative therapies, but at Mayo Clinic and in the medical and health-care fields, these techniques are known as integrative medicine, because they shouldn't be seen as alternatives to conventional medicine, but an integrated part of your health-care program.

- Supplements are one type of integrative medicine that many people are familiar with. Many people view herbs, because they're natural, as being safe. In fact, however, many patients have been harmed by herbs. But a number of studies have evaluated dietary supplements and, in some cases, have found some benefit. For example, glucosamine and chondroitin are natural products that are sometimes recommended for patients with arthritis.

- And then there's acupuncture. There is a lot of data on acupuncture. In the mid-1990s, the National Institutes of Health conducted a consensus panel where people reviewed the evidence about acupuncture and determined that there is good evidence that acupuncture can be very helpful for a wide variety of pain. Since then, there have been a number of other studies about acupuncture and its effectiveness for pain, most of which have been very positive.

- Massage is another common type of integrative medicine. When reviewing the large volume of massage studies done over the past 10 years, most of the studies have shown that massage is effective when the target is reducing pain. Sometimes having massage therapy integrated as part of an overall pain strategy



helps with the secondary effects of pain, such as tight muscles and the reduction in stress.

- People are so different from each other that it's difficult to pick which is the most promising mind-body therapy. Some people thrive on meditation while others are frustrated by it. Try to experience everything—including meditation, yoga, tai chi, and guided imagery—and find what works for you. The benefit of mind-body approaches over the others is that you can do them anywhere and at any time. Once you're trained in yoga, you can do yoga on your own at home at any time.

EVALUATING MEDICAL CLAIMS

- There's a lot to choose from in the world of integrative medicine. How do you decide what's right for you? The U.S. Food and Drug Administration (FDA) and the Federal Trade Commission have several suggestions about what to look for when evaluating any medical claim.

- Look at the language in the promotional materials.

 - Do they refer to "miracles" or "breakthroughs"? You should be highly skeptical of these kinds of claims.

 - Do the promotional materials contain pseudoscientific jargon, such as "detoxify," "purify," "energize," or "balance"? These typically don't have any medical meaning; they're just designed to sell products and services.

 - Can the product treat an amazing array of diseases? That's very unlikely, and you should be skeptical.

 - Do the promotional materials claim to have lots of data behind their claims but never show it to you? Again, that's cause for doubt.

- If the product has absolutely no downside—not one, not for anybody—but is 100 percent risk-free, that really defies the odds.

- Especially when it comes to herbal and dietary supplements, evaluate all claims with caution. Unlike the medications you receive from your doctor, dietary and herbal products are not reviewed by the FDA before they go on the market.

- Only when a supplement is proven unsafe is it removed from the market. But if it's merely useless, or if the dosage on the label doesn't match the contents, or if there are common potential allergies or drug interactions—none of that is regulated, so beware.

- Talk to your doctor. Some integrative therapies can be extremely helpful and are worth considering, but a little guidance can go a long way.

SUGGESTED READING

Bauer, medical ed., *Mayo Clinic Book of Alternative Medicine*.

Clarke, et al, "Trends in the Use of Complementary Health Approaches among Adults."

Halm, "Relaxation."

Hassed, "Mind-Body Therapies."

Johnson, et al, "Stress-Induced Pain."

Seaward, *Essentials of Managing Stress*.

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LECTURE **7**

SOCIAL SUPPORT FOR PAIN MANAGEMENT

When people don't feel well, they pull away from other people. When people are hurting, they lose interest in the things they used to do for fun. They often just want to be left alone. But that's the worst possible thing you can do. An enormous amount of research has been done on the importance of social support, and it's consistent in showing that people with a rich network of social support are healthier in almost every way.

SOCIAL SUPPORT

- Social support is the support you receive from other people. There are a few different types.
 - Physical support, sometimes called instrumental support, can be anything from helping you with chores to driving you to the doctor's office to giving you a hand as you walk up the stairs.
 - Emotional support includes lending an ear, giving encouragement, showing compassion, and just being there. This type of support is intangible, but invaluable.

- Informational support could be information about your condition or information about treatment and resources. Information can be practical, and it can also be comforting. But we consider it part of social support when it comes from friends and loved ones.

- People with strong support systems have overall better emotional health. Studies show that people who have good friends and a supportive family generally cope better with chronic pain and other symptoms. They're less likely to become depressed or anxious. They're more active and independent than those with a less supportive system.

- The data also show that people with good support systems have better physical health. They have stronger immune systems and recover faster from illness than those with less support. They have lower blood pressure and cholesterol. In fact, people with good support live longer on average than those who don't have as much support in their lives.

- Establishing and maintaining a strong web of social support is important to our health, and it is important to our ability to cope with pain. So, social support is really the sum and strength of our social contacts and social relationships.

- Every type of social contact counts—your family, friends, coworkers, neighbors, and even the people you see at the grocery store. Everyone you interact with in the course of your day is part of the social support network that acts as a buffer against stress, helping you live longer and more happily.

MAINTAINING HEALTHY RELATIONSHIPS

- When you're dealing with chronic pain, the key to maintaining healthy relationships is good communication. Good relationships always require patience, compromise, and acceptance. People need to accept each other's needs and boundaries.



- When one person in the relationship is dealing with chronic pain, those needs and boundaries may have changed dramatically since the relationship began, which can be confusing and frustrating if not communicated clearly.

- Sometimes, people with pain become uncomfortable or burnt out with constantly explaining their situation, and rather than tell people how they're feeling, they withdraw. The problem with this approach is that it can alienate family and friends, who don't know how to interpret the withdrawal.

- On the flip side, family and friends might be the ones to withdraw from the person in pain, either because they're afraid of causing harm or out of frustration that they can't help.

- In either of these situations, the burden of communication is on the person who's managing the pain. People won't know how you're feeling unless you tell them; they won't know how to help

you unless you explain. Here are some ideas for how to be a better communicator:

- □ Express what you're feeling in a positive manner, which means no complaining or accusations.
- □ Don't lie about your pain, either to minimize it or exaggerate it.
- □ If you need help, ask for it.
- □ Thank people for their help, and thank people when they offer you a compliment.
- □ When you are having a tough time, you may just need to get things off your chest—maybe by talking it out or writing it down.

- Remember that you can't control other people's behavior. You can only open the lines of communication.
- Without good communication, your loved ones' responses to your pain are likely to fall into one of two different categories: caregiving responses or punishing responses.
- Caregiving is usually someone's first response to your symptoms: being helpful and solicitous, or even overly helpful and solicitous. It can be a great comfort when a person lends an ear or a hand, but it can also be a bit limiting for both of you, because it keeps the focus on your pain. The rest of your relationship falls by the wayside.
- If your symptoms don't improve, this initial round of caregiving responses can turn into punishing responses, which include any form of interpersonal conflict, from the silent treatment to snarky comments to overt arguments. You may feel like you're being punished for something that you can't control.

- If your pain doesn't change and the other people in your life don't understand why, they may start to feel frustrated. They may feel like their efforts to help are wasted or unappreciated.

- If you've become withdrawn because of your pain, they may not know how to interpret your behavior and may be hurt or confused, or they may feel rejected.

- Sometimes, they take on too much responsibility trying to help you, or they encounter other difficulties in their life, and they become overwhelmed themselves. They develop caregiver burnout, which can be mild and temporary or severe and serious, depending on the situation.

- Both caregiving responses and punishing responses are focused on the pain. Both types of responses encourage you to focus on symptoms rather than on recovery.

- Ideally, your loved ones will have neutral responses to your pain. Neutral responses are the ones that help by encouraging your own efforts at coping.

- People with a neutral response to your pain are people who talk to you about your whole life, not just your illness. They redirect your focus away from the pain and toward other parts of your life. They encourage and assist you in using the skills you're learning in your pain rehabilitation program.

- But sometimes you have to be the leader in this process. This is new territory for them, as much as it is for you. When people ask how they can help, you can pass along these suggestions:

 - Remind them to talk about things besides your pain.

 - If you find them hovering, thank them, but ask them to let you do things on your own.

- □ Ask them to join you in some activities that help relieve your pain, such as yoga or swimming.

- □ Encourage them to keep doing the things they enjoy, even if you can't join them or have to leave early.

- □ Make sure you listen to them as much as they listen to you.

SUPPORT GROUPS

- Social support, in general, may seem like a luxury to some people. What if the kind of social support you need is not available within your current circle of family and friends? This situation is not all that uncommon.

- Although it's unfortunate that so many people suffer from chronic pain and illness, the one fortunate outcome is that, as a society, we're more aware than ever of the issue. As a consequence, community organizations and support groups are more accessible than ever.

- Support groups bring together people who are facing similar issues. These people can share their experiences, advice, and camaraderie.

- Support groups are not the same as group therapy sessions. Group therapy is always led by a trained mental health provider; support groups may be led by anyone, and they take many different forms.

- There are many benefits to condition-specific support groups, for both patients and caregivers. Perhaps the first of these is that they reduce your feeling of isolation, which can relieve some stress.

- You'll also have the ear of people who know where you've been because they've been there. They can offer comfort and advice from that shared perspective.

- Support groups take many different forms. Some are loose and freewheeling, open to many different types of conversation and focusing on emotional support. Some are more educational and structured. They may have guest speakers from the medical community or presentations from social workers or activists.

- There are in-person support groups and online support groups. No matter your location or condition, there's bound to be a group that suits your needs.

- A potential resource to finding a good support group is your doctor or other health-care provider. You can also search online, both for support groups and national awareness organizations, such as the American Chronic Pain Association and the National Fibromyalgia and Chronic Pain Association, which may be able to point you in the direction of state or local resources for your condition.

- A local community center, religious organization, or library may host support groups. You can check their schedules online or contact them directly.

- Your local telephone book or newspaper (or their online equivalents) may have listings for support groups.

- Talk to your friends. They may know of an organization, or they may know someone who knows of an organization.

- Support groups can be enormously helpful, but their one potential downfall is that they may bring the focus back around to your pain and get you caught in that same trap again. We want to try to move the focus away from your pain.

- The challenge, then, is to find ways to maintain your relationships—and even make new ones—that don't focus on your condition.

- Making friends and maintaining ties seem to come more naturally for some people than for others. And some of this becomes more challenging as we age, simply because we all become busier, or become creatures of habit. Add to that the fact that you're probably not feeling particularly appealing or energetic when you're in pain.

BUILDING SOCIAL SUPPORT NETWORKS

- What are some good new habits you can form for building social support networks? How do you make new friendships and keep the old ones going strong?

- First, take a look at the activities you've enjoyed all your life. Are there ways to adjust them to fit your current abilities?

- Then, think about what new activities you might take up. Most people find it easier to develop friendships around shared activities, and you'll lose your self-consciousness when you're focused on a task. You'll be distracted from yourself and your pain. You may find yourself laughing, which can release your body's endorphins.

- Next, take a good look at your current behavior around your relationships. If you're ignoring phone calls, avoiding social events, or holding onto old resentments, it's time to stop. All of these are keeping you from building the kinds of healthy relationships you need to live a full life.

- If you're trying to build new relationships, what are your options? If you've identified a group or a class you want to join, the next step is to introduce yourself to people. But when you introduce yourself, don't focus on your condition, situation, or pain. Just be yourself.

- Take time to focus on other people, too. Find out why they're there, what they're interested in, and what's going on in their life. Be an alert listener and genuinely interested. With practice, you'll remember those rhythms of give and take.

- All of this comes with the standard warning: moderation. Don't go from doing nothing to doing it all. Assess your physical condition and choose your activities accordingly.

- Go out on a date every Saturday night—with your significant other, sibling, friend, or coworker. Talk with someone about anything you want to, except your body and your pain. In addition, accept every social invitation you receive, even if you're only able to attend the event for a few minutes. The important thing is to go out because you made the plan, not because you're feeling better. If you wait to feel better before you go out, you could miss most of your life.

SUGGESTED READING

Mellor, et al, "Need for Belonging, Relationship Satisfaction, Loneliness, and Life Satisfaction."

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Park, et al, "Positive Affect Mediates the Relationship between Pain-Related Coping Efficacy and Interference in Social Functioning."

Ressler, et al, "Communicating the Experience of Chronic Pain and Illness through Blogging."

Seaward, *Essentials of Managing Stress*, chap. 13, "Additional Coping Skills."

Shaw, et al, "Effects of Workplace, Family and Cultural Influences on Low Back Pain."

Sood, *The Mayo Clinic Guide to Stress-Free Living*, chap. 24, "Your Tribe: Seed and Feed."

LECTURE **8**

HOW TO SLEEP WHEN YOU HAVE PAIN

Not getting enough good-quality sleep affects how your body processes pain and, in turn, affects mood and how you function physically. People who have chronic pain and don't sleep well say that they are in more pain and are more anxious, depressed, and preoccupied with their health compared to people who have chronic pain but sleep well. A healthy night's sleep is an important goal in any pain management program.

PAIN AND SLEEP

- Many people firmly believe that when they are in pain, they simply can't get comfortable enough to go to sleep. And when we look at what people in chronic pain are thinking about before they fall asleep, we find that more than any other thought, these people are thinking about their pain. Thoughts revolving around pain are more common than thoughts about what happened during the day.



- It's well known that lack of sleep can have enormous consequences, but what we don't always see is what's happening beneath the surface.

- People who don't get enough sleep are more likely to be dealing with chronic health problems, such as high blood pressure, diabetes, depression, and weight problems. Their immune systems don't function as well, so they're more likely to pick up every virus that passes their way, and they're slower to recover from illness. They have higher rates of cancer diagnoses. They have higher mortality rates from all causes, not just accidental death.

- Sleep is a necessity, not a luxury. And too many of us aren't getting enough. How did we come to a point where so many of us are sleeping so poorly? There are any number of theories about this.

- Sometimes, social or cultural factors come into play. We now live in a 24/7 world, in which televisions, the Internet, and cell phones tempt us to ignore our bodies' demands for rest. If we have jobs

that require shift work, we may not have complete control over the strange hours we keep.

- Sometimes, behavior may be a culprit. We try to self-medicate our fatigue with caffeine and sugar, which leads to overstimulation, which leads to a crash and burn, which leads to more junk food—and the cycle continues.

- At yet other times, the issues are medical. People may have poor sleep due to an underlying condition, such as obstructive sleep apnea, restless leg syndrome, or a circadian rhythm disorder. Mental health issues may play a role, including stress, anxiety, and depression. Sleep may be disrupted by the use of medications or herbal remedies. And any or all of these factors combined could be at work at the same time.

- Pain can be both a cause and an effect of poor sleep habits. The exact mechanisms are not yet clear, but studies have indicated a clear correlation between reduced sleep and reduced pain tolerance.

- Now that we know that sleep and pain are consistently linked, the focus of research has turned to discovering exactly how that association works. It may be that the sleep deficits experienced by those suffering with chronic pain are modulated by dopamine in the brain's limbic system. Dopaminergic pathways may in turn interact with serotonergic pathways. A third line of research indicates that opioid pathways are involved in modulating sleep as well as pain.

- There's a lot to be learned, but what we do know is that sleep is an important part of your body's regulatory and repair functions. We know it's important because it's one of our fundamental drives.

- A lot of what we know about sleep comes from studying humans and animals who are sleep-deprived. Animals who are completely deprived of sleep—kept awake 24/7—lose their ability to function. Many of the body's tissue repair functions occur mostly or

exclusively during sleep. If the body can't repair itself, it will cease to function.

- There is also increasing evidence that getting a good night's sleep is linked to changes in the structure and function of the brain—in other words, neuroplasticity.

- Most adults need seven to eight hours of sleep each night. If you are living with chronic inflammation or injury, sleep will not magically cure the damage, but giving your body the sleep it needs to promote tissue repair is certainly a good idea and may reduce your experience of pain. If you are living with neuropathic pain, then the neuroplastic changes that occur during sleep may be helpful to you.

- Neuropathic pain—conditions such as diabetic neuropathy or central sensitization—is often the result of changes in the basic signaling functions of the nervous system: the upregulation and downregulation of nerve signaling. As you are learning to modulate and manage your pain through relaxation, exercise, and other techniques, the neuroplastic changes in your nervous system help these changes stick.

GETTING A GOOD NIGHT'S SLEEP

- During a normal, complete night's sleep—which should be approximately eight hours for adults—the body goes through four to six sleep cycles, which take you from light sleep to deep sleep and back to light sleep again.

- There are two types of sleep: rapid eye movement (REM) sleep and non-REM sleep. Non-REM sleep is divided into three stages, with stage N1 being the first, lightest stage of sleep and stage N3 being the deepest stage of non-REM sleep.



- As you pass through the four stages, your bodily functions slow down, your brain waves slow down, and you become harder to waken. Stage N3 is also when tissue repair occurs. Then, you fall into the REM sleep phase. The brain becomes more active again. This is the dreaming phase of the sleep cycle.

- We spend about 50 percent of our sleeping hours in stage N2 sleep and about 20 percent in REM sleep. The rest is spread among the other stages—1, 2, 3, REM, then back up to stage N1, over and over throughout the night. Each cycle lasts approximately 90 minutes.

- When these cycles get disrupted, whether by internal or external factors, the brain and body can't complete those important processes of repair and rejuvenation. When you have too few sleep cycles, the same thing occurs: Your body starts the job, but it can't finish. When your sleep is too shallow—never achieving

deep sleep or REM sleep—your body goes through the motions of sleep, but the important work doesn't get done.

- This natural cycle of sleep is significantly disturbed in people who hurt. Again we come to a vicious cycle: Because uncontrolled pain is so tiring, these people are trying to catch any bit of sleep they can. They take naps all week and sleep all weekend but somehow feel like they can never catch up.

- The reason for this is because they might be getting more sleep, but it's not good-quality sleep. They're probably getting a lot of early-stage sleep and not a lot of deep-stage sleep or REM sleep. This leads to unrefreshing sleep.

- Like so many aspects of good pain management, sleep needs to be regular and structured. No matter the conditions, you should be aiming for the same sleep routine, at the same time of night, for the same number of hours, every night—no exceptions.

- To bring structure to your sleep, sleep only in the evenings. In addition, look at your regular schedule and find an eight-and-a-half-hour block that is sacrosanct. Choose it carefully, because it needs to be the same time period every day.

QUIETING THE BEAST

- If you have an irregular sleep pattern, whether you sleep too little or too much, you may find that you have trouble falling asleep and staying asleep. That may be because the moment you settle down and turn off the light and remove all other distractions, your brain fills your mind with worries and plans and stress and thoughts about what you have to do tomorrow.

- The first and simplest way to quiet that beast is to engage in meditation or structured relaxation, including deep-breathing exercises, progressive muscle relaxation exercises, and guided

meditation exercises. These exercises relax your body and mind and edge you closer to sleep.

- There are also things you can do well before bedtime to minimize stressful thoughts and maximize relaxation.

 - A light snack before bed is okay, but a heavy meal is not. Heavy meals and lots of liquids can cause heartburn when you lie down.

 - Look at your intake of caffeine, sugar, and alcohol before bed. Try to cut yourself off a few hours earlier in the day and see if your sleep improves.

 - Quit smoking. Nicotine has been proven to keep you from falling asleep, staying asleep, and achieving deep sleep.

 - A number of medications—both prescription and over-the-counter—can cause sleeplessness. Sometimes there are warnings on the packaging, but if you're unsure, talk to your doctor. You may need to find an alternative medication or simply change the timing of your dose.

 - Exercise before bed can be a double-edged sword. Overall, getting more exercise will improve your quality of sleep, but engaging in a vigorous workout right before bed will not help you sleep. Ideally, your workout should be three hours before bedtime. Exceptions might include gentle stretching or tai chi, which can help you relax.

 - A few hours before bed, banish bright light sources, such as televisions, computers, and cell phones. Exchange the television for a book under soft, golden light, or listen to an audiobook or music. Chat with friends and family, or work on a hobby that doesn't require bright light.

- To get a good night's rest, your bedroom needs to be cool, dark, and quiet, and your bed needs to be comfortable. If it's not, get that fixed right away.

- You need to give this process an honest evaluation before deciding whether it will work for you. Most people show a great deal of improvement simply through changing the habits and rituals associated with sleep.

- However, if your sleep does not improve, or it doesn't improve enough, there are several possibilities. Talk with your health-care team to determine your particular needs, but there are some common possible issues in play.

- The first issue is that your pain is not controlled well enough for you to sleep. Up to this point in the course, you have been building a pain management plan that will, with time and practice, help you get your pain under control with a minimum of medications and medical interventions. But you've only started the process; it's possible that one or more components of your plan aren't quite in place.

- There are also a number of sleep disorders, such as sleep apnea, that may be interfering with your sleep independently of your pain. These are all factors that are best worked through with your health-care team.

DRUG THERAPY FOR SLEEP

- As with pain medications, we must always weigh the risks versus the rewards, and sleep medications have many downfalls. That goes for both prescription and over-the-counter medications.

- Most of these medications have similar issues. They do not allow you to experience all of the stages of sleep; that is, they help you fall asleep, but the sleep is shallow and not refreshing.

- This is why most sleep aids are only recommended for short-term use. If your sleep cycle is in a serious muddle and you want to reset the clock so that you can get eight hours every night, taking these for a few days is not a terrible idea, but try to let your body reset itself naturally.

- Some antidepressant medications have sedative effects in small doses. Several of these are also used in the treatment of chronic pain. The basic idea is the same: By slowing down the nervous system, the process of downregulation, both the pain signals and the wake signals can be muted. If you are already taking or are considering taking an antidepressant medication for your pain, you may want to discuss how that medication might affect your sleep.

- If you find that you are unable to conquer that inner voice of worry, stress, excitement, and emotion that keeps you from relaxing through the steps outlined in this lecture, cognitive behavioral therapy may be a good choice.

- Cognitive behavioral therapy is about identifying patterns of thought and habits of mind. In this case, a therapist helps you identify what's causing the agitating nighttime thoughts and replace them with thoughts that are more conducive to sleep.

SUGGESTED READING

National Heart, Lung, and Blood Institute, "In Brief."
National Sleep Foundation, "Sleep in America Poll."
———, "What Happens When You Sleep."
Pigeon, "Treatment of Adult Insomnia with Cognitive–Behavioral Therapy."
Tang and Goodchild et al, "Pain-Related Insomnia versus Primary Insomnia."
Tang and Sanborn, "Better Quality Sleep Promotes Daytime Physical Activity in Patients with Chronic Pain?"

LECTURE **9**

THE VICIOUS CYCLE OF PAIN AND MOOD

People living with chronic pain often compare their lives to a roller coaster ride. Rarely do their symptoms remain stable. They have good days and bad days, and these changes are often unpredictable. Their pain seems to have no boundaries. When one part of their body hurts, their whole body is affected, and that means their whole day is affected. That kind of physical demand always comes with an emotional cost, no matter how mentally resilient you are. Mental health issues, and mood disorders in particular, not only create a huge amount of personal suffering, but also have an enormous impact on our families, health-care system, criminal justice system, and economy.

THE CHRONIC PAIN CYCLE

- The changes in a person's behavior and emotions once chronic pain enters his or her life often follow a predictable pattern. This pattern is called the chronic pain cycle, and it has several different components, but they're all related to one another.

- Perhaps the most obvious to most people is the behavioral cycle. These are the changes that your pain makes in your regular routine. Many of these are easy to bring to mind: Everyday activities may become difficult or even impossible to perform.

- The cycle of "push, crash, and burn" occurs when you push yourself through on a good day and end up paying for it the next day or next several days. It may be a good day that triggers this burst in activity, or it may be that you finally feel so frustrated by the limitations you feel from your pain that you push yourself to get certain chores or activities done anyway. You can't sustain this high level of activity, and the crash you experience is inevitable.

- This boom-and-bust cycle affects more than your responsibilities around the house, at your job, and toward your friends. Eventually, it affects your physical well-being and ultimately your emotional well-being.

- Moderation is a way to engage in life at a pace that is sustainable on most days—not too much, and not too little.

- Alternating periods of high activity and low activity lead to poor overall physical conditioning. When you don't use it, you lose it, making it harder to use it again. Each time you overwork yourself, you need a longer period of rest, leading to greater deconditioning, meaning that you are able to do less on each good day, and you need even more rest afterward, and so on.

- When your behavior fluctuates like this, so do your emotions, usually hand in hand. Usually, the more you are able to do, the better your mood is, and the less you're able to do, the worse your mood is. So, your emotions will follow a similar cycle to your behavior.

- The emotional pain cycle goes something like this: When you first experience pain, you're concerned, maybe even fearful. The more you worry, the more difficult it is to ignore your symptoms.

- When you receive your diagnosis, you start to feel hope—that your doctor can make your pain disappear and you can get your old life back. At the very least, knowing your condition isn't life-threatening can be a relief.

- But when the first few attempts at treatment don't fix the problem—or don't fix the whole problem—you start to feel a loss of control. You start to wonder what you did to deserve this. Objectively, you know that your pain isn't a punishment, but under this kind of stress, what you know and what you feel don't always line up.

- You may become irritable, lashing out at people over small conflicts or for no reason at all. Then, you may feel guilty for your behavior and withdraw from people to avoid lashing out. This kind of guilt only compounds the guilt of feeling unable to pull your weight. You feel upset, frustrated, and angry—and angry at yourself for feeling all these things, so you bottle it all up.

- With each cycle of good and bad days—of overdoing it and recovery—your emotions ride that rollercoaster: hope, followed by disappointment; participation, followed by withdrawal, and a huge hit to your self-esteem.

- If you don't put a stop to this cycle early on, it can lead to chronic anxiety and depression.

DEPRESSION

- Although we can't say that depression causes chronic pain, it is true that depression and chronic pain tend to occur together. If pain leads to depression, then that depression is likely to worsen your experience of pain. That, in turn, will worsen your mood, which further deepens your depression, which again worsens your pain—and so on. The two will feed each other in a vicious cycle that can be difficult to escape.



- The overlap between depression and chronic pain can be explained by biology—more specifically, the biology of the nervous system. The speed of the pain signals that travel throughout the body changes depending on circumstances. Signals are upregulated when they're urgent and downregulated when they're not as urgent.

- Certain antidepressants, taken at very low doses, can help downregulate some of those pain signals. So, if your pain is caused by overactive, inappropriate nerve signaling, a small dose of these drugs can calm down that signal.

- Pain processing takes place in various places in your brain. When a pain signal travels from somewhere in your body, through your spine, to your brain, its first stop is in your limbic system, the emotion-processing region of the brain. Among its other jobs, the limbic system plays a big role in how you feel, especially about your pain. In fact, it plays a big role in how you feel.

- Your unique combination of genetics, personality, and life history in some part determines your experience of pain.

- The same is true for mood. No one can say whether any given person with chronic pain will struggle with depression. Your situation is unique.

- The best advice anyone can give you is to be aware of the symptoms of depression and to seek help the moment you suspect you might be depressed.

- But that might be easier said than done. Depression often involves a loss of motivation. In addition, there is still some lingering stigma attached to mental health in our culture, and some people are reluctant to admit that they need treatment.

- Mental and emotional health should be taken just as seriously as physical health. The consequences can be just as devastating.

- The key indicators doctors look for in making a diagnosis of depression are "loss of interest in normal daily activities" and "depressed mood." But depression can manifest itself in any number of ways.

- If you suspect that you—or a loved one—is depressed, look out for the following:

 - □ Feelings of sadness, tearfulness, emptiness, or hopelessness

 - □ Irritability, frustration, or angry outbursts over even the smallest matters

 - □ Loss of interest or pleasure in most or all normal activities, such as sex, hobbies, or sports

 - □ Sleep disturbances, including insomnia or hypersomnia (that is, too little or too much sleep)

- □ Changes in appetite—often, reduced appetite and weight loss, but some people experience increased cravings for food that lead to weight gain
- □ Anxiety, agitation, or restlessness
- □ Slowed thinking, speaking, or body movements
- □ Trouble thinking, concentrating, making decisions, and remembering things
- □ Fatigue and loss of energy—even small tasks take extra effort
- □ Feelings of worthlessness or guilt, fixating on past failures, or blaming yourself for things that aren't your responsibility
- □ Unexplained crying spells
- □ Unexplained physical symptoms (in this case, separate from your chronic pain), such as back pain or headaches
- □ Frequent or recurrent thoughts of death, dying, or suicide, or suicide attempts

- A person may have only a few of these symptoms, or they may have all of them. The symptoms may be obvious, or they may be subtle. Certain symptoms are more common in children than in adults. It's important to recognize what's normal versus what's interfering with someone's functioning.

- It's just as important to treat depression as it is to treat chronic pain. Getting depression under control can help put you in the right frame of mind to manage your pain. And many treatments will help you manage both.

- Many of these symptoms overlap with those of chronic pain, particularly with the symptoms of fibromyalgia, or central

sensitization. The key difference is that people with depression are the ones who struggle with frequent feelings of guilt, hopelessness, and helplessness.

- Everyone has a bad day now and then, but if these are your common companions, then it's fair to say that you may be experiencing depression and need attention or further assessment.

- When in doubt, talk to your doctor. Depression is a treatable disorder. Your doctor will assess your symptoms and place them within the context of your life. If your physician feels that depression is adding to your burden, he or she will most likely recommend a combination of lifestyle changes, talk therapy, or medication.

ANXIETY

- Like sadness, anxiety can be a fleeting mood. It's normal to feel worry from time to time. But persistent, excessive fear or worry—that interferes with your functioning—is not normal and should be assessed by a professional.

- It's common for people with chronic pain to develop issues with anxiety. When you're dealing with chronic pain, you may fear the worst. Anxiety can build into what begins to feel like an avalanche just waiting for the slightest disturbance to bring everything tumbling down around you.

- The problem is that this kind of anxiety becomes a self-fulfilling prophecy. Stress increases the physical behaviors that cause pain, such as muscle tension and poor sleep. But anxiety can also lead to increased pain sensitivity for the same reason that stress and depression do: the shared neurological pathways between your site of pain and the limbic system.

- Many of the same treatments for depression are also helpful in the treatment of anxiety: lifestyle changes and talk therapy—particularly cognitive behavioral therapy, which focuses on

identifying inaccurate and negative thinking, such as excessive worry, and changing those thoughts into more effective ones. It's particularly helpful for managing all kinds of life stressors, from pain to relationship conflicts to grief.

- Because anxiety shares some of its neurological pathways with pain and depression, medications that treat these disorders may be helpful for anxiety, too. You and your physician can decide which combination of treatments is best for you.

GRIEF

- If you have chronic pain, then your life has changed. There are things you once did that you may no longer be able to do. Because of this, you may experience a sense of loss. And the most natural response to loss is grieving.

- We mostly associate grief with death, but that doesn't have to be the case. Grief can be caused by a changed relationship, the end of an opportunity, the passing of a stage of life, or the loss of security—and all of these are part of the process of adapting to a life with chronic pain.

- The grieving process can trigger a number of different feelings. In Elisabeth Kübler-Ross's model, the five stages of grief are denial, anger, bargaining, depression, and acceptance. This model is useful, but it implies that grief is a straight path from denial to acceptance.

- In the real world, grieving is rarely so straightforward. You may go back and forth among the stages several times, and you'll take excursions through emotions such as helplessness, guilt, and frustration long before you reach acceptance.

- This process is more of a struggle for some people than for others. Consider that what you have actually "lost," what you are actually

grieving, might be the difference between who you are and who you think you should be. This is perfectionism.

- Perfectionism is setting unrealistic goals and holding ourselves up to standards based on nothing but our own internal critics. The more you tend toward perfectionism, the more of a struggle accepting your new situation may be.

- How do we quiet the perfectionist? How do we accept the person we have become, the person with chronic pain, as a different kind of perfect?

 - Recognize that your loss is real and serious.

 - Acknowledge your feelings and have others acknowledge them by talking to family and friends, a medical doctor or professional counselor, clergy, or a support group.

 - Give yourself time. You'll need time to develop new goals and priorities and to adjust to your new normal.

SUGGESTED READING

Anxiety and Depression Association of America, "Chronic Pain."
Marsala, et al, "Pain Perception in Major Depressive Disorder."
National Institutes of Health. "Mood Disorders Fact Sheet."
Nielsen, "The Patient's Voice."
Turk, "Psychosocial Aspects of Chronic Pain."

LECTURE **10**

BUILDING A PAIN MANAGEMENT TEAM

Managing chronic pain begins and ends with your choices. No matter who is on your health-care team—doctors, nurses, physical therapists, behavioral specialists, pharmacologists, support group members, family members—the person running your health-care team is you. That's a lot of responsibility, but you don't have to go it alone. That's why you have a team. The job of those team members is to give you the best possible information, advice, and assistance.

PRIMARY CARE PROVIDERS

- For people with pain, in the majority of cases, the best doctor to manage their overall care is their primary care provider.

- Your primary care provider is the single health-care provider at the center of the network, the one who has all the information, test results, and different specialists' opinions—in addition to all the information from providers who have nothing to do with your

pain, such as your eye doctor or allergist—and can help you sort through the mess.

- Your primary care provider is the person you talk to first, and the person you keep talking to, no matter what your ultimate diagnosis is. This is a person who's going to be able to track your symptoms over a long period of time. This person may see a wider array of symptoms—not just those obviously related to your pain, but maybe also those that are relevant to your treatment.

- A primary care provider's focus is different from a specialist's focus. A specialist is often concerned with solving a problem. What they specialize in, to some extent, is diagnosis and treatment of an acute issue.

- Primary care providers focus on how you are recovering from an accident, for example, and how treatment is going for you. They look at how well you're gradually returning to work with the assistance of physical therapy or medication. They're concerned about what difficulties are lingering and might require additional health or assessment.

- They also focus on health promotion—making and applying healthy habits in your everyday life—and health maintenance—what you can do to stay as healthy as possible. They're not just looking at what's wrong; they're looking at what's right.

- Over the past several decades, our entire paradigm for health care has undergone a shift from simply treating disease to promoting wellness. We want to stop illness before it starts. The primary care provider is at the center of that model. That's another good reason to have one at the center of your pain management team.

- There's one more reason to make your primary care provider your main health-care contact for managing pain: Retreating from the specialists and returning to the home base of primary care means that you are acknowledging that your pain is here to stay.

- Many people continue to seek complete relief from pain even though many specialists in many disciplines have told them that's no longer a realistic goal. Never give up hope that a cure will be found for your pain, but don't wait to begin living your life again or waiting for a cure or pain relief before you can move back into your life.

- Adjustment, or adaptation, happens to a person when life circumstances change. This can be any kind of circumstance, good or bad. For example, getting married requires adjustment, but so does divorce. Good pain management doesn't require complete relief from pain. It requires adjustment, or adaptation, to a new normal.

- But there's no magic number of tests that should be run or specialists who should be consulted before a person should accept the diagnosis of chronic pain and acknowledge their new normal. And that's why a primary care provider is so valuable.

- A primary care provider can help you make that decision. That person can help you integrate and understand the information from all your doctors. A primary care provider can help you understand your remaining options and the likely benefits of each—if there are any benefits.

- For your primary care provider to lead your pain management team, you have to be comfortable with the knowledge and skills that this person brings to the table. Keep trying until you find the right fit.

PAIN REHABILITATION PROGRAMS

- Once you have a primary care provider you're comfortable with, one of the things you may discuss is whether you could benefit from a dedicated pain rehabilitation program, such as the ones offered at Mayo Clinic.

- Pain rehabilitation centers like Mayo Clinic's are called interdisciplinary pain rehabilitation centers or multidisciplinary pain rehabilitation centers. These are usually outpatient programs, and they're often associated with major medical centers and research hospitals. They offer programs of varying length and level of intensity. For example, Mayo Clinic has two-day and three-week versions of its main program.

- A pain rehabilitation program is built around the idea that pain affects every area of your life and therefore requires a broad approach to treatment. Three main disciplines—physical therapy, occupational therapy, and behavioral therapy—are integrated to address the entire person.

- Although on certain occasions the staff at a pain rehabilitation program works with pharmacologists and anesthesiologists, their focus is on other methods for managing your pain. That's for a number of reasons—perhaps the most important of which is that many people turn to pain rehabilitation programs after medications have failed them in one way or another.

- Typically, the staff at a pain rehabilitation program includes doctors, nurses, psychologists, and physical and occupational therapists. It may also include specialists in integrative medicine, nutrition, and medication management.

- Each clinic operates on its own model, but the basic process is usually the same. Wherever you go, the first step will likely be a thorough evaluation of your physical condition as well as the impact that your pain has had on your functioning and feelings. You'll be asked about medications, your work or school situation, and your relationships with family and friends. If you need any more tests, those will be performed as well.

- After your evaluation, the staff will help you set some goals—basically, what you want to get out of your time with the program. Then, each staff member or department will work with you to help


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Clinic

you attain both the core goal of general pain management and your specific goals.

- Some programs are very time-consuming and intensive. The three-week program at Mayo Clinic, for example, is basically a full-time job: eight hours a day, five days a week. You are given a schedule of program activities, and you are expected to attend them all, in spite of pain or other symptoms. Other programs may have fewer hours or be spread out over a longer period.

- However the program is set up, you should have a case manager or other team leader who should monitor your progress closely and help you assess how well the program is working for you. If adjustments need to be made, your case manager will help you through them.

- After these initial assessments, you'll begin working with your team to create a treatment program with goals that you can continue to work on after you return home, including how to organize your time in a way that helps you manage your pain—and your life.

- Medication has a limited role in relieving chronic pain. If you have been using pain medication regularly, your team will help you develop a pain medication withdrawal plan or taper that will be gradually implemented while you are learning other ways of managing your pain.

- A central part of your treatment program will be learning cognitive behavioral skills to manage your pain. These are most often taught in a group setting. In these classes, patients support one another as they learn new ways of coping and managing their chronic pain and other symptoms.

- During these sessions, you're asked to talk about how pain affects your daily life, rather than dwell on pain sensations and symptoms. Hearing the experiences and coping strategies of others may

give you ideas for how to manage your own challenges, physical and emotional.

- Spouses, significant others, and even children are welcome to attend the family portion of the program. In this part of the program, basic information about chronic pain and its effects on functioning are reviewed, as well as the important changes that have taken place in the person who has been attending the pain program. This portion of the program helps the family become acquainted with a different way of managing chronic pain.

- Family members play a powerful role in their loved one's recovery. The people participating in the program need their family's support, as well as their understanding and strength, so that they can effectively cope with significant pain on a daily basis.

DO PAIN REHABILITATION PROGRAMS WORK?

- Mayo Clinic's first pain rehabilitation center was developed in Rochester, Minnesota, in 1974, and it was one of the first in the United States. Since then, pain rehabilitation centers have been developed at Mayo Clinic in Florida and Arizona. The interdisciplinary programs at Mayo Clinic all have a goal for patients that includes safe withdrawal from opioids over the course of the three-week program while they learn strategies for managing their pain.

- Since the start of these programs, researchers have been collecting data on their effectiveness—both on programs in the United States as well as elsewhere in the world. Here's a sampling of what they've learned:

 - Randomized controlled trials from different clinical research centers have found that interdisciplinary pain programs are more effective than getting no treatment at all, and more effective than single treatments for pain—including medical treatment and physical therapy.

- There is more research supporting their effectiveness than any other treatment for chronic pain.

- Research shows that the gains achieved during these programs—lowering the intensity of pain, decreasing the amount of interference pain causes in one's life, and improving daily functioning and mood—are maintained 13 years later.

- Pain rehabilitation programs have been shown to be more cost-effective than conventional care.

IS A PAIN REHABILITATION PROGRAM RIGHT FOR YOU?

- Pain rehabilitation can be challenging. It takes serious preparation and commitment. There are a number of things to consider before you sign up for a pain rehabilitation program:

 - Is your life controlled by your pain?

 - Are your doctors saying that they have exhausted all of the medical and surgical treatments available and that they aren't sure what else they can do to help relieve your pain?

 - Are you concerned about the side effects or long-term effects of your medications?

 - Is your family's well-being affected by your pain?

 - Is your recovery from injury or illness taking much longer than you or your doctors expected?

 - Are you unable to uphold commitments to family or friends because you worry about controlling your pain?

- All these questions point at a life where pain is in control, instead of you being in control.

- Pain rehabilitation programs are designed to refocus your energy on the things you can change, rather than the things you can't.

- You cannot change whether or not your pain has happened. You cannot change your diagnosis. You cannot change whether or not a medication or a surgery is effective.

- But you can change your circumstances. That includes how you respond to your pain right now and what you do with the cards you have been dealt. These programs teach you ways that you can change your coping strategies and your approach to life with chronic pain. They set you on the right path. They put the control back in your hands.

- But to take control, it's critical to accept that the pain may always be there. You won't be able to eliminate it completely, but you can learn to manage it.

- All the other goals of a pain management program relate back to acceptance. You must be ready to accept your pain, to work with it, to achieve a normal life despite it—to have a great quality of life despite it. Acceptance is the ultimate goal.

SUGGESTED READING

Institute of Medicine, *Relieving Pain in America*.

Kawi, "Managing Chronic Pain in Primary Care."

Malladi, "Interdisciplinary Rehabilitation."

Pietilä Holmner, et al, "The Effects of Interdisciplinary Team Assessment and a Rehabilitation Program for Patients with Chronic Pain."

Townsend, et al, "A Longitudinal Study of the Efficacy of a Comprehensive Pain Rehabilitation Program with Opioid Withdrawal."

Wagner, "Comprehensive Chronic Disease Management."

LECTURE **11**

CREATING A PAIN MANAGEMENT PLAN

The purpose of this lecture is to empower you to design your own pain management program. Whether it's for yourself or for a loved one, it's time to take control and put all the pieces together that you're been working on throughout this course. This may seem like a lot to manage, but each change you incorporate into your life will begin to lighten your load, and following your plan will reduce your burdens if you stick with it.

LEARNING MORE ABOUT YOUR CONDITION

- A good pain management program consists of three parts: understanding your condition, assembling the right care team, and making the appropriate lifestyle interventions.

- If you think you need to know more about your condition, there are a number of ways to find more resources specific to your needs.

- The easiest place to start for most people is online. Start your search at Mayo Clinic's website. The National Institutes of Health

(NIH) is another great resource. It is made up of more than two dozen separate institutes focusing on specific health concerns, including the National Cancer Institute and the National Institute on Aging. Both Mayo Clinic and the NIH have a wealth of information on established medical practices and cutting-edge research.

- Some support groups can be good sources of medical information. But if someone at your support group gives you a book, an article, or a website to read, always review it with a critical eye. You may even want to discuss it with your health-care provider.

- Your health-care provider is another source you can turn to for more information on your condition. Because many appointments are brief and focused on addressing a specific issue and your provider may need to do some research to find you the best resources, make it clear that you want to see your health-care provider to learn more about your condition when making your appointment.

- It's also important to speak to your doctor if you're ready to start your own pain management program. Your doctor is there to help you set the initial goals; find specialists, therapists, or support groups; and run tests or adjust medications as needed.

TRACKING YOUR GOALS

- Creating SMART goals that address the areas of exercise, stress reduction, social support, improved sleep, and emotional health forms the basis for a pain management program. The process of creating goals helps you identify some of your most basic challenges and think about how to work toward overcoming them.

- When you create SMART goals, write them down and put them somewhere you will see them every day. Traditionally, many people use journals for this. They're inexpensive, portable, and accessible to everyone.



- But you don't have to use a pen and paper to track your progress. Use the system that's most comfortable and convenient for you: a journal, a whiteboard, a smartphone, or a computer. The best system for you is one that you enjoy using.

- Don't be afraid to test a few different methods. Try a new app. Try using a journal and an app together for a while and see which one you keep turning to.

- There should be a prominent place toward the front of a physical journal, the top of the whiteboard, or a special section of the app for your SMART goals.

- SMART stands for specific, measurable, attainable, realistic, and time-limited, and when tracking these in your journal, the M and the T—measurability and time-limited—are how you chart your progress.

- When you're working on a SMART goal such as exercise, you're not just checking a box that signifies that you exercised on a particular day. You're taking the M, the measurable part, and recording what exercises you performed, and you're using the T, the time-limited part, to track your progress toward the final version of the goal.

- You may be able to record some of your goals in more of a checklist fashion—for example, if you're trying to attend a support group meeting every week for the next year. But when a goal is complex, recording each milestone along the way is important.

- It's important because it lets you see how far you've come. Progress is motivational. It gives us a sense of accomplishment and encouragement. You should be proud of those achievements, the little ones and the big ones. Seeing these accomplishments will help motivate you on the days when it feels difficult to keep going.

- It's also important because if you're struggling, if your pain is increasing, if you find you can't meet your everyday obligations, or if anything else goes wrong, you have a record of exactly what you've been doing. You can assess the situation and adjust what you're doing to make the goal more achievable for you.

- The A in SMART stands for attainable. When we talk about a goal being attainable, it's not just the end point of that goal, but all the steps along the way. You should be pushing yourself, but not to the point of overdoing it, which will increase your pain and set back your progress. That's why, especially when you're new to pain management, it's important to track what you're doing.

- Pain management is a lifelong process. At some point, these goals may become maintenance goals, rather than progress-oriented goals, but the habits we're trying to create aren't temporary treatments. They're lifestyle changes.

- In fact, your journal-keeping should extend beyond your SMART goals. To get the most out of a pain management program, your journal-keeping needs to extend into every aspect of your life that could affect your pain.

- A daily log book will help you keep track of a number of things even when you're not specifically working on a SMART goal. It will help you keep track of:

 - your activity level (including your exercise and other activities, such as work and chores and socializing);

 - your stress level;

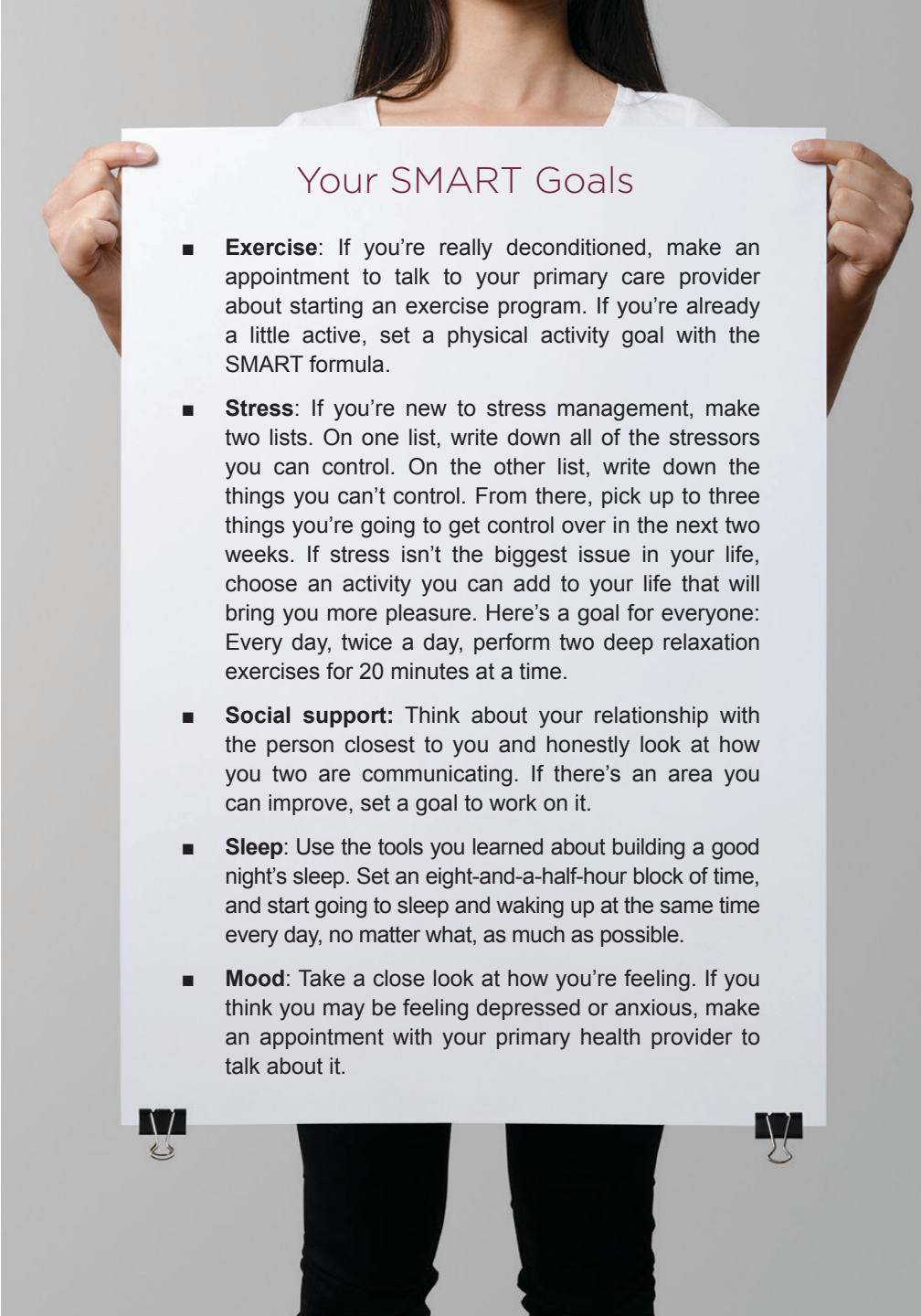
 - your sleep quality; and

 - your feelings.

- So, the next part of your journal should contain day-by-day entries. A daily journal entry should include the date, the number of hours you slept the night before (and perhaps a note about perceived sleep quality, if that's an issue for you), and your mood (1 is completely miserable; 10 is on top of the world). Do this three times a day.

- Then, throughout the day, account for all of your activities in blocks of time. You're looking for relationships between an activity and your mood. This might be a specific activity you do every day or an activity that only happens once a week. These journal entries help you pinpoint areas where you improved your coping or had more pleasant moods.

- Include a free space in each daily entry. This is a spot where you can jot down things that made you happy or angry or things you need to remember for tomorrow—whatever you need to make note of that might be relevant to your progress.



Your SMART Goals

- **Exercise**: If you're really deconditioned, make an appointment to talk to your primary care provider about starting an exercise program. If you're already a little active, set a physical activity goal with the SMART formula.
- **Stress**: If you're new to stress management, make two lists. On one list, write down all of the stressors you can control. On the other list, write down the things you can't control. From there, pick up to three things you're going to get control over in the next two weeks. If stress isn't the biggest issue in your life, choose an activity you can add to your life that will bring you more pleasure. Here's a goal for everyone: Every day, twice a day, perform two deep relaxation exercises for 20 minutes at a time.
- **Social support:** Think about your relationship with the person closest to you and honestly look at how you two are communicating. If there's an area you can improve, set a goal to work on it.
- **Sleep**: Use the tools you learned about building a good night's sleep. Set an eight-and-a-half-hour block of time, and start going to sleep and waking up at the same time every day, no matter what, as much as possible.
- **Mood**: Take a close look at how you're feeling. If you think you may be feeling depressed or anxious, make an appointment with your primary health provider to talk about it.

- Those are the basic components you should have in your journal, but you can add special sections relevant to your own needs.

ANALYZING HOW YOU'RE SPENDING YOUR TIME

- One of the things that these daily journals allow you to do is analyze how you're spending your time. Generally, your daily activities fall into three big categories: work (includes work for pay plus doing laundry and running errands), leisure (active relaxation, including hobbies), and self-care (activities necessary to our well-being, including sleep and exercise).

- Think about how you spend your typical day. How much of your time do you spend at work? How much time do you spend sleeping or trying to catch up on sleep? These are often the biggest culprits in an unbalanced day.

- A balanced day is one where your work, leisure, and self-care are spread throughout the day and where you sleep only at night. A balanced day involves about eight hours of good-quality sleep, some exercise and leisure in the morning, work or school or other obligations until midday, and then a lunch break. Keeping a journal can help you keep track of this.

- Where are you overcommitted? Where are you wasting time and energy? Once you recognize what's eating up all of your time, you can make some informed choices about what you might need to change. You can use four steps—identify, prioritize, delegate, and organize—to manage your time more efficiently.

 1. Take a close look at how you spend your time. That's where the journal will help you. Look over those entries, find the things that come up over and over again, and turn them into a list of the things you do on a regular basis.

2. Take an honest look at those activities and prioritize them. This can be more difficult than you'd think. If you are prone to perfectionism, you may want to do it all. But right now, your health comes first. You have to take care of your health first or your pain will get worse, and you may not have a choice about giving up on everything else.

3. Once you've sorted out your priorities, figure out what you can delegate. That might mean asking for help from loved ones, or it might mean hiring help. This involves a smart use of resources and good time management.

4. When you're down to the tasks you really need to handle yourself, organize and optimize them. Do you have what you need to get through your day in the most efficient manner possible, or are you wasting time and energy on the little things? You'll reduce stress and save time if you think about organizing your living spaces and getting rid of clutter. What do you need to change in your environment to prevent further injury?

- After a month of steady journal-keeping, add this SMART goal: Make a list of all the regular activities in your schedule and assign them a priority on a 1-to-5 scale—1 being absolutely crucial to your life and 5 being things you could easily give up. Then, over the course of the next month, start letting the 5s fall by the wayside, start delegating the 4s and see if you can delegate the 3s, and consider ways you can make the 2s and the 1s more efficient.

- This one is a real challenge, because it's asking you to let go of some control. But it will also help you create a good balance of work, leisure, and self-care in your day. And the more balance and regularity you have in your day-to-day life, the more control you're going to have over your pain.

DEALING WITH BAD DAYS

- As good as this program is, there is no pain management program that can promise you 100 percent relief 100 percent of the time. Pain is complicated, and it's unique to the individual. While this program can give almost everyone remarkable relief, every once in a while, you will have a bad day.

- The best thing you can do for a bad pain day is plan for it before it happens. Sometimes, bad days come out of nowhere. But sometimes, the triggers are pretty clear. It could be a bad day at work or a big exhausting event (good or bad), or maybe it's something you're not doing, such as skipping your workout too many days in a row. The more familiar you are with the triggers for your pain, the more you'll be able to prepare for a bad day.

- If you know that a bad day is coming, the best thing to do is to maintain as normal a schedule as possible. That means a balanced day.

- Diverting your attention from the pain can lessen your experience of the pain. Spend time with a good friend or engaged in a complicated hobby or reading an engrossing book—something that demands a lot of brain power.

- Another thing you want to do is calm down your pain nerves, so while sleeping the day away is a bad idea, stress-reduction activities are a good idea. That might mean guided meditation or yoga or deep breathing—whatever you find works for you to calm your nervous system and reduce pain signaling.

- Keep a positive attitude. You may be having a horrible day. It may be the worst pain day of your life. But odds are it's not going to last. You're now armed with an understanding of how pain works and what you can do to overcome it. You're the one in control.

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LECTURE **12**

ACTIVE SESSIONS: EXERCISE AND RELAXATION

In this lecture, you will discover two kinds of exercise that you may want to practice on a regular basis to manage chronic pain. One is focused on the body and involves physical exercises, including range-of-motion exercises, strengthening exercises, and aerobic conditioning, and the other is focused on the mind, teaching you how to do structured relaxation in the form of guided meditation. Remember that it's important to talk with your primary care provider before you begin any kind of exercise program.

RANGE-OF-MOTION EXERCISES

- It's helpful to perform range-of-motion exercises first thing in the morning to alleviate stiffness, in addition to performing them before your exercise routine.

- Ease into each motion slowly. Never bounce. Extend your range of motion only until you feel a noticeable pull, no further. If you

overstretch the muscles, they will tighten up—the opposite of what you want.

- Perform one set of each exercise for 5–10 repetitions:

 - **Head flexion and extension**: Bring your chin to your chest and then return it to an upright position. Avoid extending too far back to prevent aggravating neck pain.

 - **Head tilt**: Tilt your head from side to side, bringing each ear slowly toward the shoulder. Keep your shoulders relaxed; don't raise them toward your head.

 - **Head rotation**: Look from side to side, turning only at the neck. Keep your shoulders and torso straight. Do not over-rotate and strain your neck.

 - **Shoulder shrugs**: Lift and lower your shoulders, straight up and down.

 - **Forward arm extension**: Slowly swing your arms forward and then lower them back to your sides. Try to reach for the ceiling, but don't go too far if this causes pain.

 - **Arm abduction**: Raise arms to the sides, again reaching toward the ceiling. Go as far as is comfortable without shoulder or neck strain.

 - **Side stretches**: Raise your arm out to the side and over your head, bending to the opposite side as you do so. Feel a gentle stretch in your ribs. Alternate sides.

 - **Trunk rotation**: Twist from the waist, so that your torso and shoulders rotate from side to side but your hips remain facing forward.

- **Hip abduction**: Raise each leg out to the side, with your knee straight but not locked, alternating legs. Use a chair or table for balance if necessary.

- **Rear hip extension**: Extend each leg behind you, with your knee straight but not locked, alternating legs. Use a chair or table for balance if necessary.

- **Ankle risers**: Stand with your feet about 12 inches apart. Rise onto the toes of both feet and then return to flat feet. Do not lock your knees. Use a chair or table for balance if necessary.

STRENGTH TRAINING WORKOUT

- For this workout, you will need some resistance bands, dumbbells, or wrist/ankle weights. These are available at most sporting goods stores and big-box stores, both brick-and-mortar stores and online.

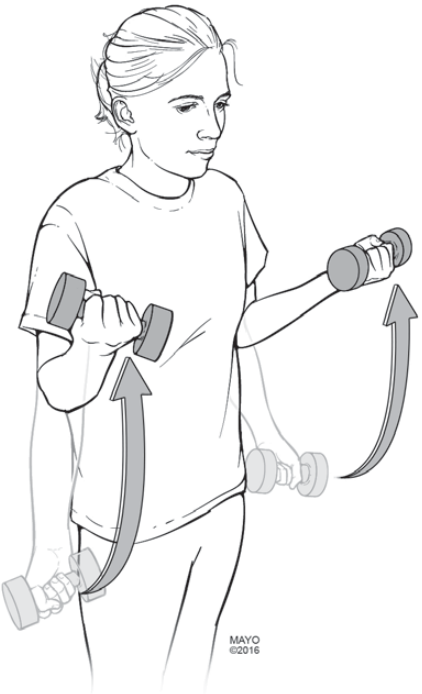
- Begin with light weights and increase as you develop strength. The "weight" of a resistance band can be increased by adjusting the length; the shorter the band, the greater the resistance.

UPPER BODY EXERCISES (10 REPETITIONS PER EXERCISE)

- **Biceps curls**

 - **With dumbbells or weights**: Begin with your arms at your sides and the weights in your hands. Bend at the elbows and bring the weights toward your shoulders, rotating your wrists into a palms-upward position as you go. Raise the weights as far as you can without bringing your elbows away from your body. Lower the weights slowly and with control. (one repetition complete)

 - **With elastic band**: Secure the center of the band under your foot. Grip each end so that the band is under little or



Biceps curls using weights

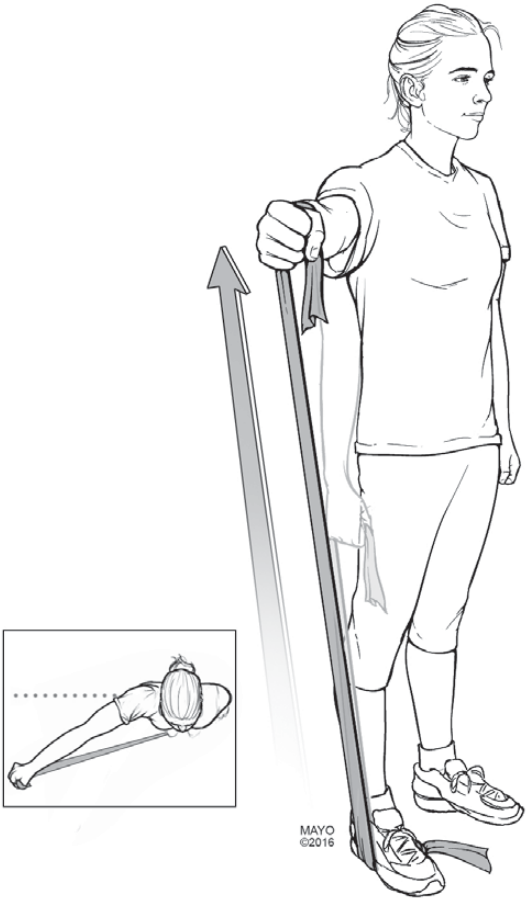


Biceps curls using an elastic band

no tension with your arms lowered at your side. Bend your arms at the elbow, bringing the hands toward your shoulders, keeping your elbows tucked into your body. Lower your hands slowly. (one repetition complete)

- **Shoulder side raise** (10 repetitions)

 - **With dumbbells or weights**: Begin with your arms at your sides and the weights in your hands. Keep your shoulders relaxed. Raise your arms to the sides, toward the ceiling. Do not let your shoulders rise into a shrug. Lower the weights slowly and with control. (one repetition complete)



Shoulder abduction using an elastic band

- **With elastic band**: Secure the center of the band under your foot. Grip each end so that the band is under little or no tension with your arms lowered at your side. With shoulders relaxed, raise your arms to the sides, toward the ceiling. Do not let your shoulders rise into a shrug. Lower your arms slowly and with control. (one repetition complete)

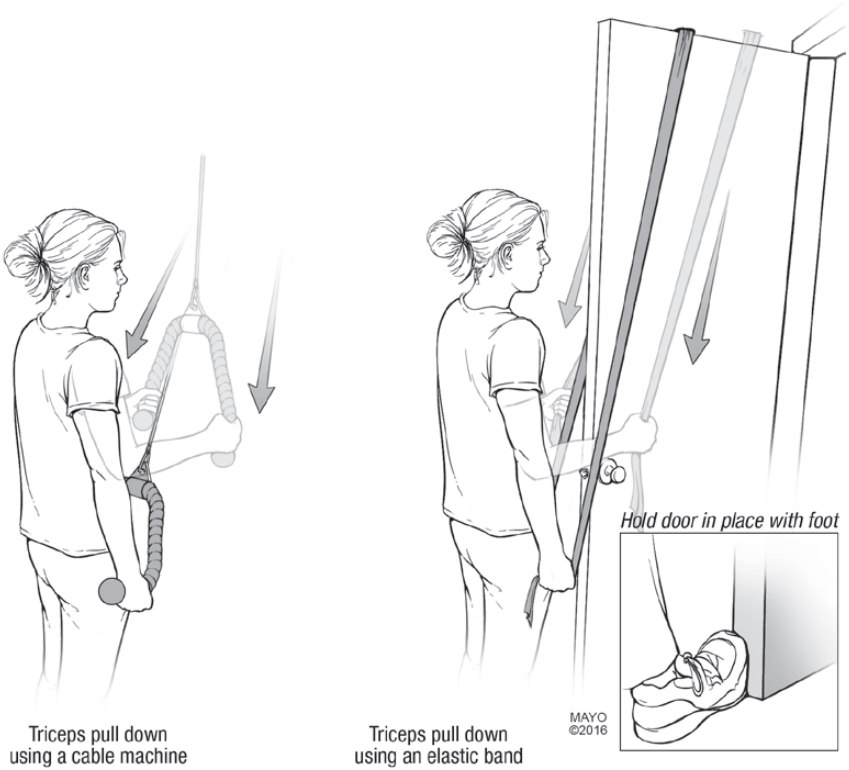
- **Triceps strengthening: three variations** (10 repetitions per arm)

 - **Triceps kickback with dumbbell or weight:** Stand in front of a sturdy table at approximately waist height. Lean forward, placing one arm on the table. Take the weight with your free hand and hold your arm out behind you, with your upper arm parallel to the floor and elbow bent at a 90-degree angle, so that your hand points to the floor. Extend the weight back until your arm is straight, but your elbow is not locked. Slowly bend your elbow back to 90 degrees. (one repetition)

 - **Lying triceps extension with dumbbell or weight:** Lie on your back with a weight in one hand. Place that hand above your head with your elbow pointing toward the ceiling, so that your arm forms a triangle with the floor and your elbow is bent at approximately 90 degrees. Slowly straighten your arm, but do not lock your elbow. Slowly return the weight to the floor. (one repetition)



Triceps strengthening using weights (lying)



Triceps pull down using a cable machine

Triceps pull down using an elastic band

Triceps extension (pull down)

- **Triceps extension with elastic band:** Wrap the band around one hand a few times and hold that hand near your shoulder, anchoring this end firmly. Bend your other arm at a 90-degree angle, with your lower arm parallel to the floor. Grip the elastic band with slight tension. Extend your lower arm toward the floor. Do not lock your elbow. Slowly bend your arm toward 90 degrees again. (one repetition)

CORE EXERCISES (WORK UP TO 25 REPETITIONS PER EXERCISE)

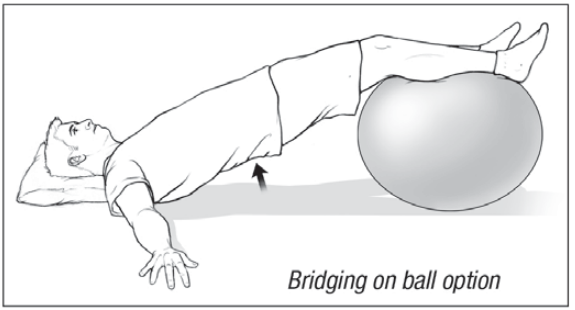
- ☐ **Pelvic tilt with march**: Lie on your back with your knees bent and your feet on the floor. Contract your abdominal muscles, pressing your lower back into the floor and tilting your pelvis slightly toward the ceiling. Hold that contraction and "march" for four steps, alternately raising and lowering each of your feet a few inches off the floor. Release your abdominal muscles. (one repetition)



Pelvic tilt with foot lifts

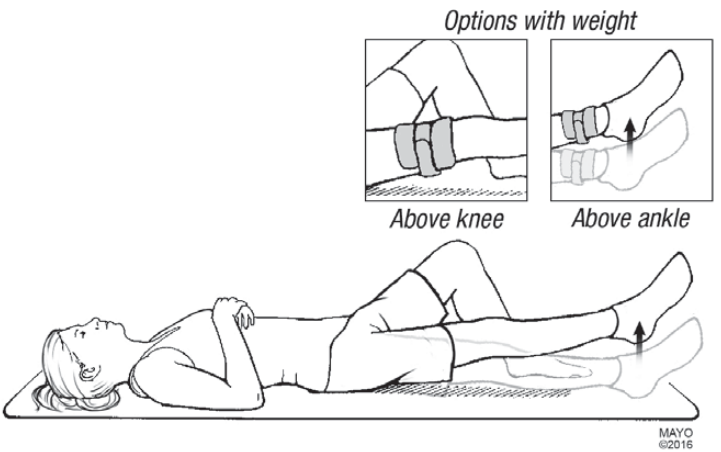
- ☐ **Bridge**: Lie on your back with your knees bent and your feet on the floor. Place your hands on the floor next to your hips. Press into the floor with your feet, hands, and shoulders (but keep your neck relaxed), and raise your hips off the floor. Lift as high as is comfortable. As your strength improves, try to get your chest, hips, and knees to form a perfectly straight line. Hold for two to three seconds and then lower your hips slowly back to the floor. (one repetition)

- ☐ **Straight leg raise**: Lie on your back with one knee bent and that foot on the floor and the other leg extended straight in front of you. Contract your abdominal muscles and tilt your pelvis toward the ceiling. Slowly raise and lower your straight leg a few inches off the floor. (one repetition; do an equal number with each leg)





Bridging



Straight leg raise (lying)

AEROBIC EXERCISE

- There are many options for aerobic (or cardiovascular) exercise available both at home and in a gym setting. Ultimately, the best aerobic exercise for you is the one that you enjoy, that you can fit into your regular schedule, and that does not increase your pain or injury.

- The easiest exercise for most people to take up is walking; all you need are a supportive pair of shoes and a place to do it. If walking causes strain on your knees, or if you don't have a safe and comfortable space to walk, consider the following options:

 - **Treadmills**: These are available in both gym and home versions and are easier on the joints than hard walking surfaces, such as concrete, blacktop, and wood floors.

 - **Stationary bicycles**: Available in both upright and recumbent versions, these take much of the strain off your knees and back, especially in the recumbent models.

 - **Elliptical machines**: These are a cross between a bicycle and a treadmill. The user stands upright, but the legs move on circular pedals, minimizing impact. Small home models are available.

 - **Recumbent elliptical cross-trainers**: These machines, such as NuStep, are especially easy on the joints.

STRUCTURED RELAXATION

- We all have a busy mind, with thoughts, worries, and plans that run through our minds the whole time we're awake. When you do a relaxation exercise and begin to quiet your mind, you'll notice all the background noise and thoughts unique to your life and to the day.

- Relaxation exercises are designed to help you learn to focus your attention—away from all of the thoughts and worries to the guided meditation. But it's not always easy to quiet the mind, so gently return your attention to the rhythm of your breath every time your focus slips away. With practice, you'll learn to quiet your mind and focus on relaxation.

- You may want to incorporate this version of guided meditation into your routine at home or modify it to suit your situation or needs.

 - ☐ Sit in a comfortable chair with your feet on the floor.

 - ☐ Close your eyes and make yourself as comfortable as possible in your chair. Pay attention to your body by uncrossing your arms, legs, and ankles. Allow your body to feel supported by the chair.

 - ☐ Let go of any worries or negative thoughts that you are experiencing today.

 - ☐ Take a deep breath, in through your nose, breathing all the way down to the abdomen. Hold it for just a moment, breathing out slowly through your nose, and as you do, relax your entire body, allowing all of your muscles to feel heavy and at ease.

 - ☐ Scan your body for any muscle tension, starting with your head and searching all the way down to your toes. Release any tension in your face and allow your jaw to feel relaxed and hang open slightly. Become mindful of your breathing and how your body feels today.

 - ☐ Breathe deeply and relax your shoulders by allowing them to drop heavily away from your ears. Take a deep breath and relax your chest and abdomen.

- □ Allow your arms and legs to feel heavy and sink toward the surface beneath you. As you draw in your focus to your mind and body, you're becoming more and more relaxed.

- □ Take a deep breath and become aware of any remaining tension you're feeling. Focus on letting go of any tightness. As you breathe out, allow all the muscles of your body to sink heavily into the surface beneath you, becoming even more at ease.

- □ Imagine yourself atop a grassy hillside. The sun is beginning to set along the horizon. You feel the sun's warmth on your face as the light begins to fall into the night. You hear the distant fade of crickets chirping on this warm summer evening. You feel the calm air against your skin and smell its fresh, clean fragrance.

- □ As you imagine yourself sitting comfortably in the grass, you take in the colors of the night—first, a blaze of orange, as the sun rests along the sky. The sky slowly transcends into brilliant shades of violet and blue. As you gaze into the sunset, the breeze begins to quiet as day turns into night.

- □ You find yourself enjoying the peace and quiet on the hillside. The shade trees become more still as their leaves gently rustle, as the sky begins to calm. The crickets, chirping in harmony, are signaling that night has come. You feel the fresh grass beneath you, welcoming you to the earth. The grass is slightly cool to the touch.

- □ You take in a deep breath, noticing the nearby flowers, still sweet with fragrance from the warmth of the day. Breathe deeply, smelling the flowers, listening to the crickets. Feel the gentle breeze cool against your skin.

- □ As you gaze on the darkening sky, you become more aware of the stars beginning to shine in the night. You notice the

flickering in the sky and become more appreciative of your surroundings. As the night becomes dark and the earth becomes more still, you're mindful of your body at peace.

- You take another deep breath, and with each breath, you become more refreshed. The night is now calm. The earth is still. You are aware of your surroundings and harmony with one another. Take a few moments and allow yourself to enjoy this peaceful place that you have just created.

- It's now time to leave the hillside. The moon is bright, allowing you to make your way down the grassy hill. You feel refreshed and at ease after taking in the sunset, the sky, and the stars. The evening sky shines on you in the tranquility of the night.

- As you leave this relaxing place for now, you know that you may visit whenever you wish. You take one final look at the stars in the sky, one last breath of the summer air, and one last listen to the chirping crickets. When you are ready, take three deep breaths and open your eyes.

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